
The church of S. Giovanni dei Cavalieri di Malta ranks among the small number of Italian buildings that are fully documented by a complete set of cost estimates known as a “misura e stima.” Avery Architectural Library of Columbia University in New York possesses an account book, acquired under the directorship of James Grote Van Derpool, which documents work on the church beginning in November 1767; on the penultimate page, dated 10 April 1767, the total cost of 10,947.29½ scudi is subscribed with a flourish by “Gio. Batt.a Piranesi Architetto.” The misura e stima runs to 762 items on 384 pages of text painstakingly written by a professional scribe. The total cost of Piranesi’s restoration was less even than Borromini’s S. Carlino, a famously inexpensive building; never in the history of Roman architecture has so much ink been spilt for such a small church.¹

There were several ways of paying for a building in baroque Rome. The simplest was to pay men for their time. The drawback was that a contract *a giornata* offered no incentive to work fast or well. Another method was to pay a lump sum to the contractor, who would purchase the materials and the labor and keep whatever was left as profit. However, this system offered numerous incentives to shortchange the client by using inferior materials. In the end most patrons came to prefer a system of piecework called *misura e stima*. Standard rates for different types of work were established at the outset, and the architect would periodically measure the amount of work done to determine how much the contractor was owed.²

Professional fees were erratic in this period and the concept of paying for a design was still in its infancy. So the *misura e stima* was one way for an architect to make money. The standard for a


misura fee was 2% of the total cost. In 1679 Giovanni Antonio De Rossi, the third generation in a Roman architectural dynasty, said that the architect should receive 2% for total misure up to 120,000 scudi, but only 1% above this sum. Sometimes it is said that 1% should come from the patron and 1% from the contractor. Virgilio Spada, the great architectural administrator of Popes Innocent X and Alexander VII, says that ordinarily the fee is 1% inside the city and more in the countryside; even in the city the fee is 2% when the work involves both a scandaglio, a weekly check by an expert who knows how to judge materials and workmanship, and a misura totale, an overall total at the end of the job.³

The misura e stima was tedious work. It involved going down into foundation trenches and up scaffolding, measuring rod in hand. It was important to measure work that would later be built over and hidden, “cose occulte.” If the architect kept changing his mind, or was unsatisfied with the work and ordered it torn down and rebuilt, it was in the contractor’s interest to make sure everything was measured first. At S. Ivo the contractor protested the official misura submitted by the architect: “Nella presente misura non si è havuto riguardo alle stravagante fatture e mostre diverse fatte per detti lavori come anco alle cose fatte più volte e poi buttate con gran sprego di calce e quantità di giornate de mastri...”⁴ Instead he submitted his own misura, which took account of the many changes in plan and the “strana e stravagante fattura” of the vault of S. Ivo.

We have the misure for the upper half of the facade of S. Carlo alle Quattro Fontane, built by Bernardo Castelli-Borromini after Borromini’s death.⁵ They run for about 75 pages and enumerate every inch of wall and every change in its direction, as well as every column, base, moulding, indentation, capital, balustrade and cornice. The cost of the work was about 3000 scudi, and the misure brought in 2%, or 60 scudi. At these rates it is obvious why good architects preferred to rely on the professional misuratore.

We have a glimpse of one such man through an anecdote told about Borromini’s S. Carlo alle Quattro Fontane. One day a Capuchin monk named Fra Michele da Bergamo walked into Borromini’s newly-finished church. Fra Michele was an architect himself, responsible for the Capuchin church of the SS. Incarnazione, but he spent of his working life doing other people’s misure. Someone asked him how much he thought the church was worth. He looked around with

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⁴ Archivio di Stato di Roma, Cartari-Febei, vol. 115, fol. 46v-47r.

⁵ The misure e stima of Bernardo Castelli-Borromini’s second story are preserved in the Archivio degli Trinitari Scalzi at S. Carlo alle Quattro Fontane; they run from 23 September 1675 through 25 March 1677; for an analysis see Rosamaria Francucci, *La facciata della chiesa: i due momenti della sua costruzione*, in “Bollettino del Centro di Studi per la Storia dell’Architettura,” 30, 1983, pgg. 95-99.
his practiced eye and replied, “il valor di questa chiesa non si può arrivare altrimente, che pienandola di piastre.” This may be an innocent remark, like saying the church was worth its weight in gold, but it also may reflect the bafflement of the professional misuratore confronted with a building, full of curves and complex surfaces, that must have been agony to measure.6

The top class of architects relied heavily on such professionals: “Il misurare non sempre si fa da gli architetti, anzi quelli di prima classe si arrossiscono di misurare.”7 Architects did not want to be confused with mere misuratori, and tried to distance themselves from this task and this type of man. Della Porta’s scathing judgment of his contemporary Carlo Lambardi partly stemmed from Lombardi’s willingness to make money by doing misure e stime: “che è mesuratore, et non Architetto, et non li piace.”8 Paul V was not very satisfied with the sacristy of SMM by Flaminio Ponzio, “perché sempre li papi si vogliono servire di suoi muratori per architetti e però se non riescono non è meraviglia.”9

Everything depended on the honesty of the misuratore, and there was ample room for intrigue. Nicodemus Tessin, visiting Rome in the 1670s, sensed some of the opportunities for fraud in the system. If the architect were in league with the patron, he could refuse to hand over the misure and thus delay payment to the mason, putting him into debt. But if he were in league with the masons, he could inflate the misure and overlook bad work.10 Borromini warned of the deals made between masons and architects to inflate the misure at the patron’s expense:

“Non lasserei alcuno lavoro a stima, perche l’esperienza dimostra, che sempre si fa più pregiudiziale a quello che fa fabricare, che al muratore, per l’intelligenza che passano tra li simatori, et muratori, et particolarmente regali, et altri interessi...”11

Even with someone like Borromini on the job the patron might still insist that an outsider be hired to check the misure, because, as one prelate in the Propaganda Fide explained to another,

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6. Pollak, Kunsttätigkeit, p. 47, reg. 225, and also regs. 37, 273, 523-71, 701, 739 and 860. Fra Michele da Bergamo appears as early as 1625, when he and Domenico Castelli sign the misure for the Fontana dell’Ape by Borromini in the Vatican Belvedere; cf. Howard Hibbard e Irma Jaffe, Bernini’s Barcaccia, in “Burlington Magazine,” 106, 1964, pg. 169 sg., n. 64; the total bill was 645.59 scudi, reduced to 545.59 scudi, for the fountain and other routine work that came out of Maderno’s studio.
7. Virgilio Spada, quoted both in Pollak, Der Architekt, 1909/10, pg. 209; and in Antonazzi, Palazzo di Propaganda, 1979, pg. 89, n. 87.
“V.S. Ill.ma sa molto bene che cosa sono architetti e muratori.” Even though he had the reputation of being scrupulously honest (“E odiato da gl’arteggiani perché egli ne rubba ne lascia rubbare...nel stimare è così moderato che è più l’utile che il danno che riceve il Padrone”), Borromini still tried to distance himself from the misure:

“non volse mai misurare ne sotoscrivere misure fatte da soi giovani--dicendo che non conveniva al architetto di fare altro che disegniare et ordinare che le fabbriche caminano bene--e non di intrigarsi nelli interessi tra Capimastri e padroni delle fabbriche..... fu huomo disinteressato--non stimò mai in alcun tempo il denaro, e dalli padroni delle fabbriche non volse mai cosa alcuna per poter con magior libertà operare a modo suo.”

This background helps to put the Avery account book into context. It is identified in the first line as a “misura e stima” of the restoration carried out at the expense of Cardinal Giambattista Rezzonico, “Gran Priore di Roma della Sacra Religione Gerosolomitana,” under the direction of Piranesi, who did the misure himself: “misurati e stimati de ma sottoscritto architetto secondo la loro qualità, e quantità.” The misura e stima was signed by Piranesi but written by a professional scribe, who took great care to turn the normal day-to-day misure into a magnificent volume.

S. Giovanni dei Cavalieri di Malta was built by a contractor who expected reimbursement for both work and material: “il tutto fatto a spese de materiali, e fattura di Giuseppe Pelosini capo mastro muratore.” Given the adversarial situation that usually prevailed, indeed was expected to prevail, between architect and capomastro muratore, the misura e stima should not have been drawn up by Pelosini himself. But the book gives the impression of coming somehow or other out of Pelosini’s shop, and on the last page he signs a receipt dated 30 October 1737 for 300 scudi. The crude, semi-literate signature shows that Pelosini wrote with difficulty. If the payment of 300 scudi was for the misure, as Wittkower assumed, then we would have a doubly unusual situation, in which the architect accepts a misura provided by the capomastro muratore and pays him at the unusually high rate of 3%. Unlike most misure e stime the point of the Avery account book was not to reduce a contractor’s pretensions or to cut costs, but to record the project with microscopic precision.

Stucco
The principal contractor for a baroque building was the capomastro muratore. Most other contractors, the scarpellini, falegnami and ferrari, signed their own contracts and had their own misura e stima. The scarpellino carved his blocks of stone on the site and delivered them to the muratore, who was responsible for putting them into place (“mettitura in opera”); the muratore

12. Cardinal Orsini’s letter to the secretary of the Propaganda, insisting that the Dominican Giuseppe Paglia be used to check the misure of Borromini’s assistant Francesco Righi, in Antonazzi, Palazzo di Propaganda, 1979, pg. 61.
also installed the roof beams supplied by the carpenter.

The stucco finish on a building was usually the responsibility of the muratore or an artisan in his employ. But in the seventeenth century the stuccatore developed into an independent professional. The best were in great demand. We have a glimpse of one of the most successful in the person of Giovanni Maria Sorrisi, the artisan responsible for the cupola stuccoes of S. Carlo ai Catinari (1626), Cortona’s ceilings in Palazzo Pitti (1641-44), the crypt of SS. Martina e Luca (1644-45), and the stucco decoration of Villa Pamphilj (1646). In 1638-40 Sorrisi did the stucco work inside the Oratorio dei Filippini. Borromini was a stern taskmaster and submitted the finished job to a long critique, blaming Sorrisi for numerous unfinished details and subtracting them from the bill. From this document we learn that the patron had to supply the stucco di marmo, the architect a mostra for the capitals and modini for the mouldings, and the stucco worker only his skill and the small tools.\(^{15}\)

But an architect could demand still higher skills for his stucco work. Borromini insisted that the angels in the vaults of S. Ivo be carved by a sculptor, not the usual stuccatore. Piranesi too would insist on a sculptor, Tommaso Righi, for the most important details of the stuccos of his church on the Aventine. Righi’s name comes up countless times in the Avery libro di conti, for every delicate detail, from the ornament and capitals of the facade to the decoration of the nave vault and apse.

To see how a stucco artist worked, it is helpful to look at an unfinished building. The cupola of S. Andrea delle Fratte, left unfinished by Borromini in 1665, is a good example. As the building rose the scaffolding rose with it; when it reached the top the smith was called in to delive the ironwork for the finial and cross; then as the scaffolding came down the bare brick was covered with a final layer of stucco. In contemporary terminology the bare brick core was the “corpo” of the building, the stucco ornament the “anima.”

The Avery account book gives us the technical vocabulary of the stucco artist. He worked around an “aggetto di mattoni e cocci,” such as the keystones over the windows of the cupola of S. Andrea or the protruding tiles on the capitals. The next step was to hammer nails into the brick and create an armature of twigs: “amarmato con verzella retto da chiodi longhi fissi nel muro.” Forms were roughed out crudely at first: “bozzatto di gretone a calce,” and then finished with a layer of fine stucco, “stabilito di stucco bianco” into which the fine details were carved. This formula is repeated hundreds of times in the Avery libro (for example item no. 160).

Construction

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S. Maria del Priorato was built in 1568 and thus was two centuries old when Cardinal Rezzonico took the restoration in hand. Piranesi did very little new building. The first paragraph of the libro mentions the work to be done: risarcimento al circondario de muri del giardino, portone con una nuova piazza, adornamento della chiesa con sua facciata, diversi lavori nel palazzo a l’abitazione della famiglia.

One can follow the work step by step in the libro. The Aventine bastion on which the old church stood was in need of considerable repair; Piranesi shored it up with extensive foundation work and added a Rezzonico coat of arms to the middle of the sperone (item no. 61). New foundations were dug both inside and outside the facade, which was chained to the side walls (104, 110). A truely Piranesian event happened during during the foundation excavations: a large ancient cornicione was discovered; eventually it was sawn in two and brought to the piazza (21). Tombs were disturbed and relocated, especially those of Cardinal Pestacarraro and Riccardo Carraccioli (136, 140). On 5 December 1764 a precious relic was unearthed, the head of S. Savino, inside a marble cassetta which cracked when excavators broke the masonry mass around it. It was found between the porticella that leads to the palazzino and the tribune; seven men worked into the dark hours by candlelight to extract it (155).

A new roof was built on five strong trusses which were chained to the old vault to give it support from above. The side walls of the church were raised to support the new roof and the facade too was given an attic (177, 181, 187, 189, 190). Old coats of arms--of the Knights, the Medici, the Salviati and the Pamphilj--were removed from the facade (250). New peperino stairs were installed in front of the church, while on the interior the floor level was lowered (290-91).

On 1 May 1765 the scaffolding was temporarily removed from the facade and tribune so that they could be inspected “da i Sig.ri Cavalieri di Malta.”

Piranesi installed a lanternino over the fourth bay of the nave. Today it is hidden inside the roof and is almost always dark. At best it could receive a ray of morning light through an oval window placed over the apse, facing east. The lanternino is mentioned several times in the libro dei conti, and although it is difficult to reconstruct the precise situation it seems to have been better lit than at present: “Per aver tagliato due arcarecci del tetto, ove si sono fatti li due lucernarij per dar lume a lantermino sopra la tribuna della chiesa”; each lucernario measured 7 x 7 palmi, and a stagnaro was called in to make sure water was kept out of them (188, 193-96). A guardarobba was accessible between the vault of the church and the roof (202). There is mention of a new campaniletto over the side wall of the church (209).

Misure are always precise in their wording and introduce us to many of the technical terms of the maestranze, particularly that of the stuccatori. The visitor to the exhibition on the Aventine will see the church with sharpened vision by reading passages from the account book in front of and
inside the church. Out of the 762 entries I select a few that describe some of the most unusual and inventive features of the church: the pediment and capitals of the facade, the conch and capitals of the apse.

The sphinx capitals of the facade:
Per l’aggetto de mattoni, cocce, ed altro simile armato con verzelle rette da chiodi longhi fissi nel muro, due similmente si e fatto la traccia per incassarvi l’aggetto de tevoloni delle tavole delli sei capitelli, che quattro di prospetto alla facciata, ed altri due nelle rivolte alle testate di essa facciata sopra li pilastri, bozzati di calce e stabiliti di stucco bianco che sono di ordine Ionico moderno con sue tavole centinate scorniciate con ovolo, intacca, ed abbaco, volute scorniciate nella loro grossezza con pianuccio gola dritta ed intacca, fra le quali sotto il corno del capitello si è intagliata, e scolpita una testa di cherubino, con festoncini di fioretti di granato; che ricopre l’unione delle volute nel corpo delle quali in luogo del giro della spira vi sono state fatte sfingi, che poggiano colla zampa d’avanti alle torri nel mezzo de capitelli lavorate scantonate bugnate alli angoli ed attorno le porticelli con frontespizio sopra, cordone, fenestra, terminata da capo con suoi merli sorretti da mensole con cornice sopra poggiando esse torri sopra il collarino con imoscaco centinato in pianta fra le volute sudette ornato ed intagliato il fregio, che forma corpo di gola dritta fra il collarino sudetto, e di altro ove terminano li pilastri con foglie refesse nel mezzo, bottoncini a piedi ed altri fioretti che nascono fra le dette il tutto ben ricercato terminato alto l’uno essi capitelli p(almi) 3 ½ longhi stessi assieme tutti sei colle loro rivolte p(almi) 5/6 di aggetto nel maggiore fuori del vivo del pilastro p(almi) 1 1/6 oltre la traccia fatta per murare l’aggetto per la tavola de sudetti forma p. 1½ (item no. 269).

The swords on the facade:
...l’ornati rappresentanti fodri di spada quarniti con diversi fogliami legature di fettucce, medaglie con sue figurine, mascheroni, impugnatura di spade terminate da capo diversamente con pomi in forma di teste di aquila, ed altro con serpenti che si avv.?.cchiano attorno uno di essi foderi (273).

The tympanum of the facade:
...le due corazze che fanno ornato nel mezzo del timpano del frontespizio accanto l’arma di marmo di S. Pio Quinto, lavorate intagliate con diversi rabeschi, mascaroncini, aquile a due teste, fasce a piede il corpo pendoncino sotto detto ornato con diverse mascherine con finale a piede in forma di fettuccia, fatto l’istesso alli bracciali, una de quali lavorato il corpo a forma di squamme di pesce, fattoci sopra li due morioni lavorati vuoti al di sotto che si sono armati con sue gabbie diramate di ferro filato similmente rabescati ed ornati con diverse figure e mascaroncini, terminati da capo con sue pennacchieri di piume, il tutto ben ritrovato terminto e polito, e da piede fra le dette corazze fattevi la sua croce compostà da cue barre lisce sopra posta al globo che resta di sotto detta e corazze...” (260).
The trophies on the facade:
...le due insegne militari ne(i) sopradescritti due fondi composte ciascheduna con figura alata con rama di palma in mano, che pianta sopra la tabella requadrata da fascia attorno e l’iscrizione FERT nel mezzo terminato l’asta a piede detta insegna con borchia scolpita con mascherina nel mezzo, e festone fra detta e tabella legato da fettuccia che scherza a piede dett’asta, sopra quale figure vi è il Pro Cristo circondato da festoncine di fiori di granato altro ornato sopra legato da un festoncino nel mezzo, e circondato da catena composta di diverse anelli che legano assieme le due mezzze lune sopra il dett’ ornato quali sorreggono la torre intagliata con merle alte di gia descritte, riportatovi scolpita una medaglia con sua testa al disopra di essa torre e terminata essi insegna da capo con croce sua corona sotto, e traversa piana con due ornati pendenti alli estremità il tutto ben lavorato e polito...[plus the pendant sword by] Tommaso Righi scultore che ha fatto le sudette due fame (276).

The surround of circular window on the facade:
...li due ornati che restano dalle lati della fascia circolare attorno la fenestra composti detti ornati da due bolzi l’uno sopra l’altro lavorati in forma di rivolta di voluta ionica antica con fregio nel mezzo sopra cui vi sono diverse rosette con sue fronde frappate ricorrendovisi sotto, che sopra esso fregio un ordine de fogliami frappate e terminate in punta fra quali altre sotto foglie simili con sue ghiande alli estremità scompartito il restante di essi ornati con sette baccelli cavi con listelli attorno, e frezze con sue aste fra detti ricoperti in parte da foglie longhe con sue costole il tutto fatto a degradazione centinato di prospetto e di profilo alto dett’ ornato p(almi) 7 3/4 largo assieme alle due bande con sue rivolte p(almi) 8 di agetto nel maggiore p(almi) ½ oltre il muro rustico che vi cresce adietro la grossezza di p(almi) 1/3 mattoni...
...due cartelle a lato il descritto ornato formate ciascheduna da un serpe che termina colla testa al centro della medema la voluta da capo, e da pede forma il suo rivolto coll’intortigliamento della coda terminata da pede con suo fiorone con roverso sotto per campanella con sua goccia; sopra quale voluta da pede vi nasce una foglia di cerqua frappata con sua costola per roverso riquadrato il vano che resta fra il corpo di essa cartella, o sia mensola di profilo con cornice intagliata con foglie sopra il corpo della gola... (283).

The capitals of of the columns in the tribune:
...il capitello di ordine ionico moderno sopra detta colonna con sua tavola da capo scorniciata con ovolo intacca, ed abbraco volute sotto detta tavola con serpi lavorati con pelle a squamme, che ricorrono sopra il listello di esse volute intralciandosi le teste di detto sotto li corni del capitello, ricorrendo il festoncino intagliato a fiori di granato nel vano sgasciato(?) fra le volute terminato da capo con sua foglia sotto al corno sudetto, ovolo intagliato con suoi ovoli e listelli attorno e lancetto fra mezzo, tondino intacca, e vivo sotto. Festone di fiori diversi che nasce del centro delle volute e scherza sopra il vivo del capitello nel mezzo di esse, ed ai lati. Aquila con due teste incoronata da corona ducale, che posa colle zampe sopra detto festone e risponde coll’ale sopra la nascita delle volute nel prospetto del capitello e nelle rivolte di detto in luogo dell’aquila
fattoci le mezze rose nella tavola intagliate e frappate il tutto ben ricercato terminato e polito.... (382).

The cornucopiae in the volutes of the capitals:
...ovolo fra dette volute intagliato con suoi ovolo framezzati da lancette, tondino ed intacca con vivo sotto; nascendo dal centro delle sudette volute li cornucopij che s’intralciano nel mezzo de vivi di detto capitelli, e terminano a piedo con scappate de frutte fiori verso l’angoli di essi capitelli lavorati detti cornucopij in pelle con fogliami frappati al loro principio e nel mezzo della tavola fattoci l’ornato in forma di candelabro con diverse modinature, e fogliami, che posa sopra li descritti collarini al prospetto principale e mezzo candelabro con cornucopia con simile nella risvolta di detto... (382).

Conclusion
Visitors to the church during the exhibition will hopefully enjoy the unusual experience of reading passages from the *misura e stima* in front of the church or inside it, and find that the text enhances their vision, like looking through a pair of powerful binoculars. But they may also be surprised by the kind of detail they see. Anyone used to the Piranesi of the “speaking ruins” will be slightly puzzled by the fact that the master of Etruscan engineering and Roman construction technique, the attentive student of the emissario del Lago di Albano and of Cecilia Metella, in the end built a baroque church, composed mainly of stucco ornament in the tradition of Borromini, Juvarra and Vanvitelli.

In the *Della Magnificenzia* of 1761 Piranesi gave some indication of where he would go if he were given the chance to build a building. For all of his admiration for the unadorned power of the monuments of Etruscan and Roman engineering, his heart lay with the exuberant architecture of the later empire, when “Greek caprice had added ornament to structure.” Piranesi ends *Della Magnificenzia* with a clarion call for a new hero, not of theory but of practice, an “ingengno più penetrante,” a “spirito più virtuoso” who will enrich architecture with new rules and new ornaments. In a sense he is calling for his own arrival on the scene as a practicing architect. *Della Magnificenza* was produced under the patronage of Pope Clement XIII Rezzonico, the patron who would encourage Piranesi still further with the tantalizing but eventually unfulfilled commission of 1763 to rebuild the apse and choir of the Lateran basilica. There too Piranesi showed that in architecture he intended to remain the faithful follower of Borromini, the poet of baroque stucco.

The brilliance and finish of Piranesi’s Lateran drawings is partly due to the fact that he soon realized the the project would never be carried out. For all of their seductive qualities the drawings were inefficacious as instruments of persuasion. Destined never to guide the builder, they would instead replace the building and immortalize the artist’s idea. At the bottom of Tavola Decima the instruments of drawing, the compass and chalk holder, are shown with a
bird’s wing and a snake coiled in a circle.\textsuperscript{16} They are hieroglyphs of the commission’s fate: the building would not be built, but the drawings would take wing and would be eternal.

The Avery account book has a similar function. In its obsessive detail and picturesque language it transcends the function of mere accounting. Were the catastrophes that brought the brick and ashlar buildings of ancient Rome to ruin to strike the church, the account book would always be there. Payment is not the only function of the Avery volume. It is the complete description of Piranesi’s only building, the semantic equivalent of the church and the guarantor of its immortality.

\textsuperscript{16} Wilton-Ely, 1993, fig. 71.