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I. Introduction

High-profile, multi-million dollar auctions of paintings by well-known artists in the Eighties have aroused much conjecture as to the profitability (or folly) of purchasing art as an investment.[1] Popular literature boasts that investing in art is not only a surefire way to earn spectacular returns, but also a pleasurable and engaging pastime (Rush, 1974). Economic analysis suggests a more dismal outlook. Research has shown that while some wisely selected pieces yield substantial returns to investment, most art will tend to under-perform other more common investment options as stocks and bonds, and that purchasing art will leave the owner with heavy long-term losses.

Still, art is not only owned, but also consumed. Possessors of fine art reap utility associated with its aesthetic qualities. And a rational investor should be willing to bear the opportunity cost of investing in art (that is, the loss from not investing in stocks) if the cost is refunded through consumption. There is, therefore, a possibility that art markets not only match the performance of stocks and bonds but also exceed them when the value of consumption is recognized and included in the comparison.

This paper will revisit the economic question "is buying art profitable?" facing any potential investor by focusing specifically on the market for prints. The answer will account for both pecuniary and aesthetic benefits. Previous inquiry into the returns of investments in art and their methodologies is first reviewed. Then a framework for measuring utility from prints from market-observed leasing prices is described. Various price indexes for returns to Picasso and Chagall prints are compiled for the years 1977 to

[1] This paper was prepared as a senior proseminar project under the supervision of Professor David C. Ribar, Department of Economics, The George Washington University. The author wishes to thank Professors Robert S. Goldfarb, Richard Agnello and Melvin P. Lader, Andrea Long, Clint Hall, Christopher Loscalso and Evelyn Tauben for their advice and assistance.

1997 using a market basket technique. The indexes are then combined with the utility framework. Real and nominal returns to prints, both with and without consumption, are compared to those in stocks and bonds. I find that although prints barely maintain real value in most periods, an investor with sufficient appreciation for art may reap significant annual and long-term returns by purchasing prints. For such individuals, participation in art markets is wholly rational, if not advantageous.

II. Literature Review

William Baumol (1986), though preceded by some studies to which we will later attend, is the father of modern economic inquiry into the financial returns of art markets, and his work is the foundation from which later analysis was to develop. His chief contribution was to lay the ground rules for the later study, specifically by noting several differences between art markets and markets for more conventional goods. His and other early studies were performed on paintings. He pointed out that paintings are heterogeneous, each one having widely differing characteristics. Even similar works, according to Baumol, on the same theme by the same artists are imperfect substitutes. Sales of a particular piece of art are relatively infrequent and a century or more may pass until a particular object is brought to market again after a sale. And finally, as opposed to shares of stock, which have a "true" value (the "pro rata share of the discounted present value of the company's future earnings"), the value of paintings is entirely subjective.

Implied in this final characteristic is Baumol's pessimistic assertion that since the single determinant behind the value of a work of art is personal taste, and since tastes

change unpredictably over time, there is no possibility for significant long-term real growth in the market.

In attempting to prove his claim, Baumol confronted the same difficulty that all later researchers (Agnello, et al 1999; Reeneboog, et al, 1999) would have to face. When measuring returns to any common good, say, iceberg lettuce or ¾ inch bolts, one need only observe the market price for the good over time and calculate returns using simple arithmetic. But if works of art are (highly) imperfect substitutes for one another, it is conceivable that there exists a unique rate of return for each painting extant.

To solve this quandary, Baumol analyzed auction data for paintings collected from 1651 to 1961 (309 years) and discovered 640 repeat sale transactions. He then deflated them into constant terms and calculated the yearly return between sale periods. This may be labeled a "repeat sale regression" (Burton and Jacobson, 1999), one of three methods considered in this paper. Making no allowance for transaction costs he finds an average annual return of .55%. This is a loss of almost two percentage points per year compared to government securities.

Baumol's data and methodology are far from perfect. Clearly, it systematically selects only a small portion of the market (Burton and Jacobson, 1999). For instance, paintings of the highest quality may be purchased by museums and thus never reenter the market at all (Stein, 1977).

Moreover, Buelens and Ginsburgh (1992) recognize that Baumol's low rate of return in art investments cannot be entirely representative of the market since some cases of significant profits are observed. They theorized that since tastes change slowly, higher

returns are achievable when examining shorter time periods and then returns for specific styles of art within those time periods.

Using Baumol's data and method, but with shorter time periods and including an expanded data set, Buelens and Ginsburgh found an average return of .65%. But when broken down into time periods and schools, returns were greatly diversified. For example, impressionists yielded a 28.4% return from 1950 to 1961, while English Painters (who comprised 50% of Baumol's sample) lost 6.9% from 1914 to 1949. The conclusion then is that diverse characteristics of art must be considered within shorter time periods to achieve a full understanding of rates of return.

Unsatisfied with the repeat sale regression method, Buelens and Ginsburgh introduce a second method of analysis, the "hedonic regression" method (Burton and Jacobson, 1999). In this method, the entire set of auction data is considered, and run through a regression equation of the following form:

$$(1)\quad \ln p_{kt} = \gamma + \sum_t \beta_t z_t + \sum_t \alpha_{i0} x_{i,kt} + \varepsilon_{kt}$$

Where p is the price of painting k sold in year t, Z is a dummy variable taking the value of one for a particular year and zero otherwise, and x the particular characteristic of a painting such as its size, the name of the artist, or the presence of an artist's signiture (Bulens and Ginsburgh, 1992). If the researcher can isolate all significant factors contributing to an individual's valuation of a painting in the x terms, beta should represent the pure effect of time and give an index value for the appreciation of art over time, when the beta for year 0 is normalized to one. This method allows for a consideration of a much larger sample than the repeat sale method, but is limited in that

the researcher must not only identify every characteristic of a painting relevant to determining its value (Burton and Jacobson, 1999).

A third method available to researchers constructing a price index for the value of art over time is the "market basket" approach. As mentioned earlier, paintings (and all other art objects) are heterogeneous, making the observation of a single price across time difficult (Burton and Jacobson, 1999). But by selecting a representative sample and following the progress of that sample over time, a representative price index can be produced. This method is somewhat similar to the construction of the Consumer Price Index. A basket is chosen and price data recorded. The basket is then either replicated for succeeding years with works that most closely resemble those in the original basket in size, style and painter, or for more homogeneous data sets randomly regenerated each year.

Here the critical question is "what paintings go into the basket?" Reeneboog, et al (1999) choose randomly from an existing data set. Others use pre-determined baskets (such as those chosen by industry "experts") to measure their performance or to gain an intentionally broad scope of the market (Burton and Jacobson, 1999).

Regardless of what method is chosen, selection of proper data presents a significant difficulty to the measuring of returns to investments in art. Nearly all studies base their findings on auction data. Early studies (Baumol, 1986; Bulens and Ginsburgh, 1992) based their computations on data found in Gerald Reitlinger's *The Economics of Taste*. Though it covered a large time period, it was not intended as a comprehensive survey of art transactions. Reitlinger excluded auctions at his discretion, especially those of small size; therefore skewing early results significantly (Candela and Scorcu, 1997).

A comprehensive data source is therefore necessary. Researchers studying markets' particular sectors (based nationality or medium) have simply collected data from auction catalogues published by houses specializing in that sector (Candela and Scorcu, 1997). Others studying broader markets have used *The Art Auction Index* or *Gordon's Print Price Index*, which are indexed collections of auction catalogues from multiple auction houses.

Some have challenged the relevance of auction data in measuring returns to investments in the arts. Auction prices may be considered "wholesale prices," and any study based on them systematically excludes retail sales (Candela and Scorcu, 1997). Auction fees, too are rarely considered, but can represent up to thirty percent of an auctioned good's value (Frey and Eichenberger, 1995), and may have been severely distorted in the recent past through price fixing between major auction houses (Surowiecki, 2000). Art auctions are rife with personal idiosynchrasities that may cause prices to be inflated or reduced unnaturally (Goldfarb, 2000). Finally, auction data, as it is recorded in published indexes, may not provide ample information about the piece in question, especially an objective measure of condition, to run a meaningful hedonic regression.

Having reviewed methods and problems associated with measuring returns to investments in art, we may examine results concluded by some researchers since Baumol (1986) about paintings. Most research tends to confirm that gains are possible for some styles and holding periods, but returns to art are mediocre overall. Renneboog (1999), using a market basket and hedonic regression analysis, finds that for Belgian paintings 1970-1997, an annual nominal return of 7.6% is achievable. Outliers influence this

number, as nominal returns at the median are only 5.5% for the same period. A boom in the late eighties is the major factor behind the gains; both before and after the market is generally unmoved. Agnello (1999), using a hedonic analysis has similar findings. The early eighties were years of both gains and losses, followed by a peak in the late eighties where annual returns topped 37% in 1989. These gains were followed by equally large losses in the early nineties (the market lost 41% in 1991). The overall nominal return found is 6.9%, not dissimilar to Renneboog.

The implication of these returns is that while some works of art may appreciate at tremendous rates, and still more at reasonable ones, the general market real returns are below those of stocks and bonds as well as, in some cases, the CPI.

There are two prevailing explanations for continued participation in a "losing" market. The first is that paintings are a hedge against inflation. This argument is somewhat irrelevant given frequent negative real returns. The second is that owners of paintings enjoy not only the returns to their investment, but a measure of consumption value.

This is the Mexican Hat of art investment economics: Nearly everybody dances around it[2]. Baumol (1986) does not mention it at all. Some recognize its existence but do not enter into a discussion of its possible scope. Frey and Pommerehne (1989) note, "consumption benefits of owning a picture which may consist in pure aesthetic pleasure or in the prestige gained must play a significant role" in motivating purchases of art, but do not elaborate further. Czujak (1997) begins her discussion of Picasso Paintings at

[2] The author wishes to remind readers that the quality of metaphors, like the quality of art, is ultimately subjective to the varied tastes of individuals.

auction by pointing out consumption values inherent in art, but does not return to the subject.

Other researchers offer consumption value as an explanation for the gap in returns. Implicitly assuming an efficient market, Angello (2000) claims that the loss an owner of art endures is the total amount that is consumed. Burton and Jacobson (1999) suggest the same method. This "residual approach" is somewhat flawed in a few respects. It does not offer a measure of the utility reaped from a high-return painting, which (given the high returns) should be quite significant. Moreover, corporate art collecting, a significant segment of the market, may be the personal domain of executives who purchase paintings inefficiently, implying that the total loss taken on paintings is not the full consumption value (Frey, 1997).

A non-residual method is therefore needed to estimate the consumption value gained from paintings. Some researchers (Graeser, 1993) have posed that a rental scheme can provide the insight necessary to quantify the consumption value related to art. The amount that people are willing to pay in order to simply display a painting but not own it is the amount at which they value the pecuniary effects of the painting, since they are not receiving any investment returns. This is convenient in that it uses the value of a painting as a proxy for the myriad of factors (size, color, subject matter) that determine an individual's appreciation of a painting. All but one researcher claim that these rental schemes are not pervasive enough to be properly studied and therefore do not carry the analysis through.

Stein (1977) analyzes just such a rental scheme to derive a workable estimate for consumption values for paintings. He theorizes that utility is an increasing linear

function of the value of a painting, and uses a figure of 11% of assessed value as an estimate of that utility. This estimate may not be entirely appropriate since it does not recognize diminishing marginal utility.

III. Data and Analysis

The focus of this paper now narrows from art in general or paintings to prints because they may be more accessible to an average investor. "Prints" is a catchall term for works produced by a number of methods, including relief-making, engraving, drypointing, etching, lithographing and silk-screening (Hults, 1996). While the technical aspects of each process differ, it is sufficient to note that all involve the transmission of an image created by an artist on a template onto a sheet of paper. Multiple copies of a single image are made, after which the artist will destroy the original template. Some artists create lithographs exclusively, though many painters and sculptors are also prolific lithographers. Since multiple copies of a single work exist, and since they are often considered to be of inferior quality to oil paintings and sculpture, prints, even those by "high-end" artists, can be purchased more readily and at lower prices than works other media. It therefore may be easier for an average investor to construct a diversified portfolio of prints.

Returns to prints have been measured using similar methods to those used for paintings. The same movements reported in paintings (the late eighties boom and early nineties bust) are found in prints, but with more muted returns (Pesando, 1993). Real annual returns in the market equaled only 1.5% for 1977-1992. It has also been found that the market for prints by Picasso yields higher returns than the market in general

(Pesando, 1993), but the movements in the two markets mirror each other, allowing Picasso to be used as a proxy for general measurement (Pesando, 1999).

To measure utility reaped from owing a print, a pricing scheme for an art-leasing program administrated by the Orlando Museum of Art (OMA) is observed. The OMA leases over 150 modern prints from its collection to the general public for two-year periods. Prices are determined as a function of the print's assessed value. As written above, these prices can be said to reflect a lower-bound dollar expression of utility gained from prints as a function of their value, since they capture only consumption benefits and yield no investment returns. The prices are listed in Table 1. This schedule reflects diminishing returns at the individual print level. A $500 print is priced at 55% of value, while a $7,500 print costs only 6.3% of assessed value. While the OMA charges a flat $1,000 for leasing of any print valued at over $10,000, a constant utility function of 5% of assessed value has been substituted for use in this study. Note that the OMA provides insurance, as well as delivers and installs all prints. These prices reflect the total cost borne by a leaser.

It should be pointed out that this utility framework does not recognize diminishing or increasing returns at the portfolio level. Does owning two prints reduce or increase the utility reaped from the prints individually? It is possible that in as much as prints are substitutes for one another, the more prints one "consumes" the less one values each at the margin. Still, if the prints can be combined to complete a set or series (much like baseball cards), their combined whole may be worth more than the sum of the parts. Later studies may examine the prices of complete portfolios of prints compared to those of their component images when sold individually to solve this question. But since the

answer is intuitively ambiguous, constant returns to scale at the portfolio level are assumed.

No utility framework is developed for stocks or bonds. It can be said that they possess value beyond their financially observable prices. Some stocks can be held as a hedge against risk, or even for the aesthetic value of their certificates (Disney in particular). Still, this complicates the analysis and is not included.

Having established a methodology for measuring utility, it is now necessary to construct a price index from which investment returns to prints may be considered. The existing indexes supplied by Pesando (1993, 1999) for returns to prints are not sufficient because they do not provide prices of individual prints from which to determine utility.

This study considers a twenty-one-year time period, from 1977 to 1997. Following Pesando (1999), auctions for prints by Pablo Picasso are used as a proxy for conditions of the print market as a whole. This is especially convenient as Picasso was a prolific printmaker and hundreds of his prints are auctioned each year, supplying a broad range of data. As a safeguard against taking too narrow a consideration, auctions for Marc Chagall prints are separately studied under the same methodology.

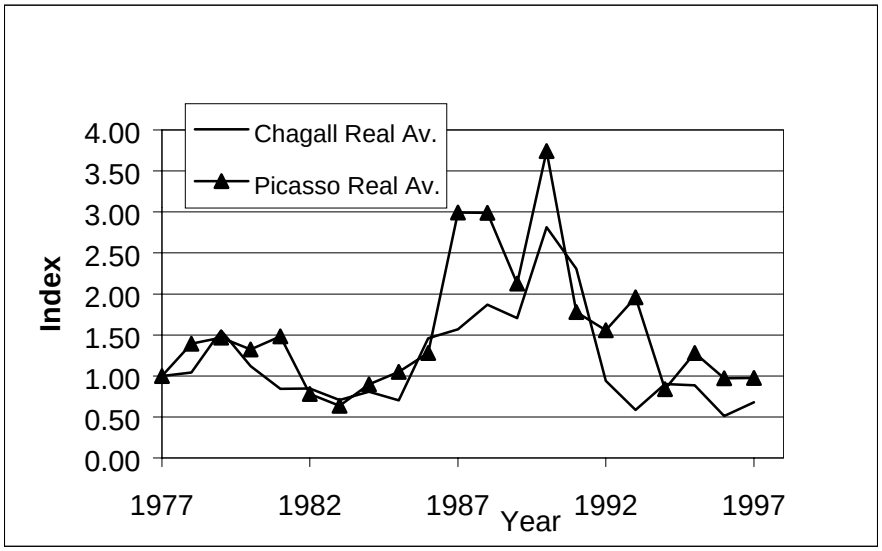
For each year and each artist, thirty auctions were selected from *Gordon's Print Price Annual*, a comprehensive listing of all works on paper auctioned in a particular year. The reported price from each auction is recorded. Selections were made randomly. *Gordon's* reports prices of ceramic works by Picasso in some years and these are systematically excluded. Auctions that failed to meet their "reserve" price, the minimum price at which an owner will allow his work to be sold, large portfolios containing

multiple prints, or repeat records were not included and another record substituted in its place. A total of 1,260 records were observed.

These records are readily converted to price indexes to measure returns. Two of the three indexes suggested by Renboog (1999) are constructed for each artist. The "average" basket is simply the average value of the thirty prints selected for a given year. The "median" basket takes the median value of the thirty prints selected for a given year to adjust for outliers and portfolios that may not have been screened out. A basket where the component prints are held constant and replaced from year to year is not used. This is because in cases where a version of the component print is not sold in a particular year, an entirely subjective selection must be made of a replacement. Even when there is a repeat sale, there is no accounting for quality (a criticism of Pesando's index).

Indexes are normalized to 1977=1 and reported in Tables 2 and 3 in both nominal and real terms. Real baskets have been deflated according to the CPI. Both the nominal and real returns show the same characteristics observed by other researchers, including Pesando, about general trends in art markets: slow movement in the late seventies and early eighties, a significant peak in the mid-eighties, and a market crash in the early nineties which effaced nearly all real gains. This drop even pushed the Chagall index into real losses. The median indexes tend to under-perform the averages, which is to be expected since they do not include the high-priced outliers. Picasso tends to do better than Chagall, while the Chagall and Picasso indexes move together, indicating that either may be used as a proxy for market behavior.

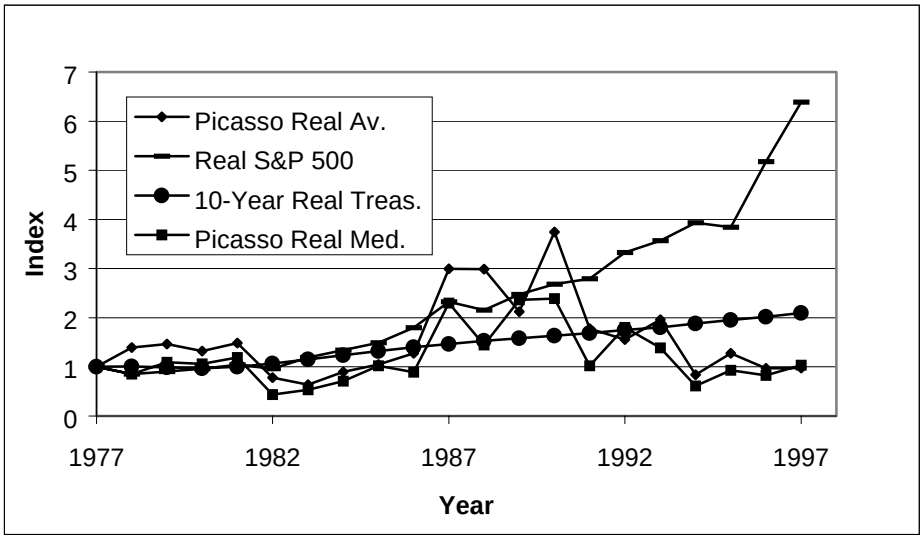
Figure 1:
Real Index Values



This index shows that the possibility of real gains does exist in art investments. An investor who bought into the prints market in 1977 and had the foresight to sell off her holdings in 1990 would realize an annual real return of nearly seven percent.

Though the possibility of real gains exists, seeking after them seems unwise when compared with the gains consistently achievable in other forms of investment. Here the S&P 500 and 10-year treasury rate have been formed into 1977=1 indexes for comparison with the print indexes. As visible in the chart below, the Picasso Real Average and Median Indexes tend to move around the 10-year treasury rate, posting returns but with much greater volatility and risk. The Median and Average almost never outperforms stocks. In fact, investing in the Picasso median index and holding it for the 21 year term would incur a real opportunity cost of nearly seven times the original investment. But for the boom of the late eighties, art performance is generally lackluster when compared with the alternatives.

Figure 2:
Picasso Compared to Other Investments



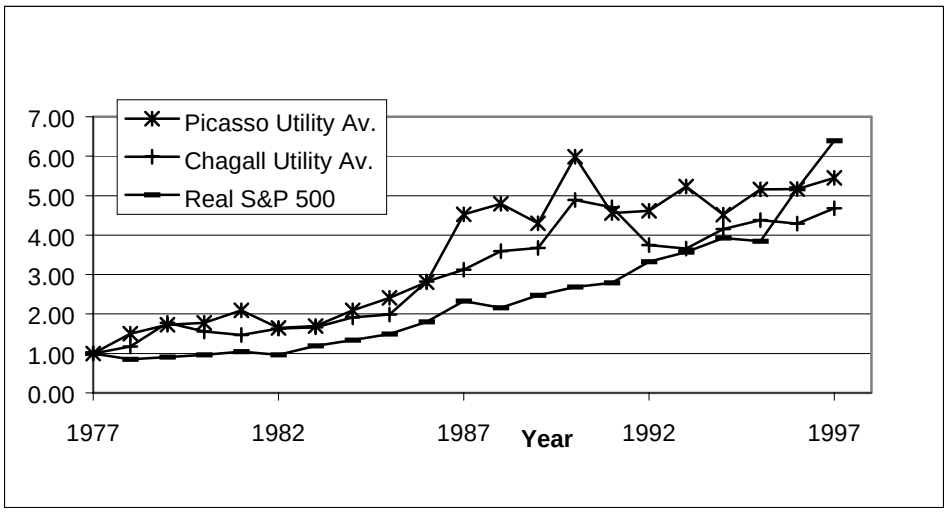
The indexes may now be reconstructed to include utility. For each unique auction price, a corresponding utility value is determined according to the framework discussed above. These values are then summed to find the total utility of the prints owned in a year. New median and average baskets are made by adding the summed, time adjusted value of the previous utilities to the value of a basket in a particular year:

$$(2)\quad I_t = \frac{V_t + \sum_{n=0}^{t} U_n (1+\rho)^{(t-n)}}{V_0 + U_0}$$

I is the index value for year t. V is the sum value of the basket in year t, U the utility value of the basket in year t, where 1977 is year zero and rho the rate of time preference, here set conservatively at 3%. While the sum value of the average basket is simply the sum value, the median sum value must be calculated by multiplying the median value by thirty. For the median basket, all utilities are calculated from the median value. Again, the indexes are normalized to 1977=1. The utility adjusted index values are reported in Table 4.

When consumption value is factored into the total appreciation of prints, investing in art becomes much more attractive. The Picasso average index shows a real annual yield of 8.8%, while Chagall follows close behind at 8.0% over the twenty-one year period. These returns fall only a hair short of the S&P 500's 9.7% real return for the same time, and this only because of the terrific stock market gains of the late 90's. An investor selling the Picasso average portfolio at the market's peak in 1990 would realize a 13.6% annual rate of return, compared to the S&P 500's 7.8%.

Figure 3:
Utility Adjusted Indexes and Stocks



Given the superior performance of an investment in prints when accounting for utility, it should seem odd that individuals are not attempting to break into the market *en masse* to reap these returns. It should be remembered, however, that the utility framework was drawn from a series of prices paid by individuals who desired to have a print of significant quality displayed in their home or office. This entire analysis, then, applies only to an individual who already has an appreciation or personal affinity for art. For those who do not, their utility valuation is presumably lower than the latter, lowering the returns found here and making entry into the art market prohibitive.

This paper has succeeded in explaining investments in the arts as economically rational behavior. Though previous researchers had attributed continuing participation in a "losing" market to consumption value, few attempted to quantify and examine this hypothesis. Some weaknesses of the model do bear exposition. In determining consumption value as a function of price, we fail to recognize that this value reflects both consumption and financial benefits which may skew the analysis. As pointed out earlier, the utility framework recognizes diminishing returns at the individual print level, but not at the sum portfolio level. This could either under-or-overstate the analysis. Finally, the analysis assumes that owners of prints purchase their investments at the prevailing market rates. However, were they to "find a bargain" (perhaps by finding a valuable print at an estate sale), returns could be significantly higher.

Is buying art profitable? In purely financial terms, not often. But when the non-financial, aesthetic values gained from owing works of art are considered, an art lover stands to reap significant gains.

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Tables

Table 1: Lease Price Schedule

Value	<$500	<800	<1000	<1500	<2000	<2500	<3000	<5000	<7500	<10000	>10,000
Price	$275	300	325	350	375	400	425	450	475	500	1,000

Table 2: Picasso Nominal and Real Print Price Indexes

	Nominal Av.	Nominal Med.		Real Av.	Real Med.
1977	1.00	1.00		1.00	1.00
1978	1.50	0.92		1.39	0.85
1979	1.76	1.31		1.47	1.09
1980	1.77	1.45		1.32	1.06
1981	2.22	1.79		1.48	1.19
1982	1.24	0.70		0.78	0.44
1983	1.05	0.88		0.64	0.53
1984	1.54	1.22		0.90	0.71
1985	1.87	1.81		1.05	1.02
1986	2.31	1.61		1.28	0.89
1987	5.61	4.31		2.99	2.30
1988	5.84	2.83		2.99	1.45
1989	4.35	4.84		2.13	2.37
1990	8.07	5.15		3.74	2.39
1991	4.00	2.31		1.78	1.03
1992	3.60	4.17		1.56	1.80
1993	4.67	3.30		1.96	1.39
1994	2.05	1.50		0.84	0.61
1995	3.21	2.34		1.28	0.93
1996	2.51	2.14		0.97	0.83
1997	2.58	2.74		0.97	1.03

Table 3: Chagall Nominal and Real Print Price Indexes

	Nominal Av.	Nominal Med.		Real Av.	Real Med.
1977	1.00	1.00		1.00	1.00
1978	1.12	1.03		1.04	0.96
1979	1.86	1.50		1.55	1.25
1980	1.49	1.20		1.12	0.88
1981	1.26	1.00		0.84	0.67
1982	1.35	0.88		0.85	0.55
1983	1.16	0.82		0.70	0.50
1984	1.38	0.90		0.81	0.53
1985	1.24	0.69		0.70	0.39
1986	2.64	1.40		1.46	0.78
1987	2.94	2.09		1.57	1.11
1988	3.65	2.39		1.87	1.22
1989	3.49	2.72		1.71	1.33
1990	6.07	1.94		2.81	0.90
1991	5.19	3.24		2.31	1.44
1992	2.18	1.65		0.94	0.71
1993	1.40	1.27		0.59	0.53
1994	2.21	1.48		0.90	0.60
1995	2.23	1.96		0.89	0.78
1996	1.33	1.18		0.51	0.45
1997	1.80	1.33		0.68	0.50

Table 4: Utility Adjusted Real Indexes

	Picasso Utility Av.	Picasso Utility Med.	Chagall Utility Av.	Chagall Utility Med
1977	1.00	1.00	1.00	1.00
1978	1.50	1.07	1.18	1.12
1979	1.73	1.46	1.78	1.54
1980	1.77	1.63	1.56	1.39
1981	2.09	1.96	1.47	1.37
1982	1.65	1.52	1.63	1.45
1983	1.69	1.79	1.67	1.57
1984	2.09	2.15	1.92	1.77
1985	2.41	2.62	1.99	1.83
1986	2.80	2.75	2.82	2.36
1987	4.53	4.22	3.12	2.86
1988	4.80	3.84	3.60	3.19
1989	4.30	4.88	3.68	3.52
1990	5.99	5.25	4.89	3.44

1991	4.56	4.42	4.70	4.16
1992	4.62	5.35	3.75	3.78
1993	5.23	5.32	3.66	3.86
1994	4.52	4.97	4.16	4.17
1995	5.16	5.55	4.38	4.57
1996	5.17	5.78	4.29	4.55
1997	5.45	6.27	4.68	4.85