The effects of the Dutch museum pass on museum visits and museum finances[1]

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Abstract

The Dutch museum pass gives unlimited access for a year to most major Dutch museums and around the half of all Dutch museums for a fixed fee. The fee revenues are distributed among participating museums in proportion to the amount of visits by Passholders and their ticket prices. In this paper, it is researched whether the museum pass increases the number of museum visits and whether it leads to higher revenues of participating museums. For this, an econometric count model of museum visits is used. The model accounts for different characteristics of museum visitors with and without a museum pass as well as for the endogenous relationship between museum visits and the ownership of a museum pass. It is found that owners of a museum pass visit a museum three times as much as they would have done when they would not own a museum pass. We estimate that in 2012, the 900,000 owners of a museum pass made 3.4 million additional visits to participating museums because of the museum pass. Consequently, museums earned in total € 14 million more by participating in the museum pass. In addition, additional visitors spend money in their cafe's, restaurants and museum shops.

1. Introduction

The Dutch museum pass gives unlimited access for a year to 400 Dutch museums for a fixed fee. Participating museums include large museums such as the Rijksmuseum, Van Gogh Museum and the Anne Frank House, as well as small museums. The pass was started in 1981, replacing many discount passes from individual museums. The main goals of the Dutch museum pass are to increase the number of (repeat) visits to museums and to strengthen the bond between museums and visitors.

The museum pass is sold for a fixed fee that was € 39.95 at the beginning of 2012. The reduced fee for children and adolescents until 18 years old was € 19.95. In that year, there were 0.9 million pass holders. Revenues minus administrative costs are received by participating museums, amounting to € 28.7 million in 2012. In that year, pass holders made on average 5.6 museums visits using their pass, amounting to 5.0 million 'pass visits' in total. The participating museums had 20 million museum visits in total in 2012. So 'pass visits' tale account for 25% of total visits to the participating museums. The distribution of museum visits per pass holder is downward sloping as Figure 1 shows, with many pass holders actually not making any visits to a museum in a year. 7.700 museum pass holders visit a museum with their museum pass more at least 25 times a year.

Figure 1 Distribution of the number of museum visits by pass holders in 2012
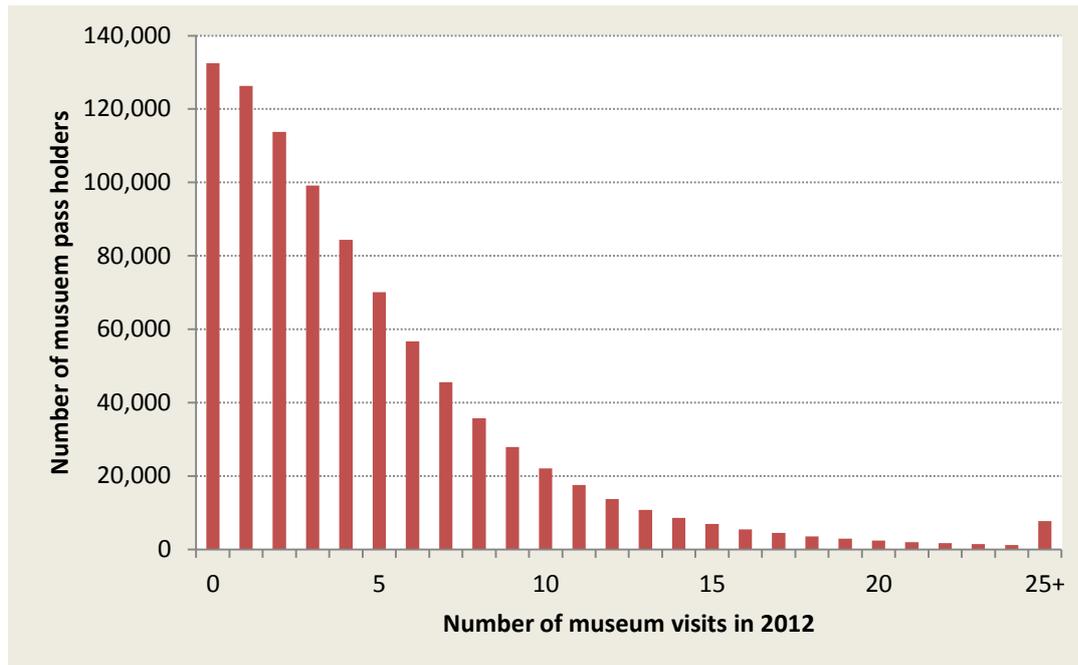
To our knowledge, there is only one other national pass in Europe: the Swiss Museum Pass. This pass has a smaller client base of about 50,000 pass holders and a higher price (155 CHF, about € 125). There are, however, regional passes which sometimes cross borders. An example is a three-country museum pass in the border regions of Germany, Switzerland and France. (price for *locals* € 73, client base 32,000, for tourists € 26, client base 15.000). In addition, there are city passes in e.g. Paris, Berlin and Venice. These passes usually aim at tourists, having a limited time span for free visits.

Most scientific literature considering the effect of museum entrance prices on museum visits has tackled the question whether museums should have free entrance or not. Examples are Bailey & Falconer (1998), O'Hagan (1995), Dickenson (1993) and Prieto-Rodriguez & Fernandez-Blanco (2006). This discussion is mainly about accessibility of museums, as it is discussed whether charging entrance fees makes museums even less attractive for the large part of the population that does not like to visit museums. Meanwhile, free access to museums implies that a larger charge of museum costs have to be paid by taxpayers, whereas museum visitors originate mostly from the wealthier part of the population. Recently, Frey & Steiner (2012) have suggested that museums should use a "pay as you go" pricing strategy where exit prices reflect the time spent in a museum. As the marginal costs of visiting a museum is zero for museum pass holders, as well as in the situation of free entrance, results of these type of analyses are useful for this research. It is known that the demand for museum services is price inelastic (Luksetich & Partridge, 2006). Goudriaan, De Groot & Schrijvershof (2008) estimate a price elasticity of -0.18 for Dutch museums, which means that the demand lowers with 1.8 percent when admission prices increase with 10 percent. Goudriaan, Been & Visscher (2002) and Goudriaan & Visscher (2006) estimate that Dutch museum visits would increase by 30 percent if all museums would have free entrance. This estimate is based on cases studies in France and Britain. The costs for society would however be large, as museums would then be fully tax funded. They also point out that entrance fees are on average just 25 percent of the total costs of a museum visit, as travelling costs are substantial. This holds however mostly for international tourists who have large

travelling costs. Dutch Museum Pass holders are mostly from the Netherlands itself and mostly visit museums that are relatively close to their home.

Berkhout, Kok & Van Ophem (2000) estimated the effect of the Dutch museum pass on museum visits before. They found that museum pass holders in 1998 visited museums 34 percent more than they would have without a museum pass. There are however large structural differences since 1998, as back then most museum pass holders got their pass free with their bank account (3.9 million people) or with their train pass (0.7 million people), whereas only 160 thousand people bought a museum pass. Nowadays, free museum passes with a bank account or a train pass do not exist anymore, so all 900 thousand museum pass owners deliberately bought the museum pass. Therefore, it is expected that the effect of the museum pass on museum visits is much larger.

Frey and Meier (2006) have modelled the finances of museums. They translated a model of Throsby (1994) for the behaviour of performing arts firms to museums. In this model, museums are assumed to be utility maximizing with respect to the number of visitors and the quality of exhibitions. In this model museums gain revenues from entrance fees, donations and grants, and from ancillary goods like the museum shop, restaurant and cafe. The entrances fees and the revenue from ancillary goods depend on the number of visitors. They claim that museums typically have a cost structure of high fixed costs while marginal costs are close to zero. Bailey & Falconer (1998) argue that these marginal costs are only close to zero in the short run when a museum is not operating at full capacity. Otherwise, costs have to be made to accommodate for extra visitors.

Furthermore, several game theorists have analysed the problem of how to allocate museum pass revenues between participating museums. This problem is called the museum pass game and has first been described by Ginsburgh & Zang (2001, 2003). Casas-Méndez, Fragnelli, & García-Jurado (2011, 2013) and Wang (2011) have done further research in this topic. These articles claim that distribution of the museum pass revenues by revenue loss sharing is not optimal, as it might encourage museums to raise their entrances fees to generate higher revenue. This might theoretically lead to museums that can improve their position by opting out of the museum pass. The Dutch museum pass however uses a revenue loss sharing distribution of the pass income, and in practice, there has not been a museum in the last 10 years that left the museum pass program. In contrary, the number of participating museums is steadily rising. Therefore, the theoretical museum pass problem does not seem to be an empirical problem.

In this paper, we aim to contribute to the literature by looking at empirical effects of a national museum pass, applying econometric methods to revealed preference data. Given the existence of city- or region-level museum passes in several countries, this provides indications of opportunities to expand such passes to the national level or of introducing a national pass.

The paper answers two questions. The first is whether the Dutch museum pass increases the number of museum visits and the second is whether the revenues of participating museums increase because of the pass. These questions are relevant from both a cultural and an economic perspective. In a cultural perspective, it is considered beneficial for people to increase their cultural experience, for instance by visiting museums more often. From an economic perspective, the revenues for museums are very relevant, as structural challenges for the financial management of museums exist (Lindqvist, 2012). These perspectives are linked, especially in the long run. If people visit museums more often, they will in all likelihood influence others (including their children) to visit museums more often in

the future, which will among other things increase museum revenues. And the other way round, if museums receive higher revenues they may be able to expand or improve their collections, increasing their cultural value.

2. Method

The estimation of the number of museum visits that can be attributed to the museum pass has several complexities. First, there is an endogenous relationship between owning a museum pass and the number of museum visits. People who derive more utility from visiting a museum also have a higher likelihood to purchase a museum pass. The effect of the possession of a museum pass on museum visits is therefore endogenous and cannot be estimated with a simple regression model. Second, the outcome variable is of a count nature, so it is needed to use a type of a count model. The mean (5.5) and the modus (0, see Figure 1) of the number of museum visits are not equal, and therefore a standard Poisson count model is not suitable, as it assumes the mean and modus to be equal. The Negative Binomial (type 2)-model does not need this assumption to hold, so therefore this model is used. Third, it is possible for potential museum pass buyers to already get free or reduced access to museums for being aged 65 or higher, being a student or, in several municipalities including Amsterdam, having a low income. Potential museum pass buyers who get a discount on museum entrance fees could be less inclined to buy a museum pass.

To take into account of these complexities, we estimated a multinomial endogenous treatment model with a Negative Binomial (type 2)-distributed outcome variable. Models of this type are described by Deb & Trivedi (2006). As no analytic solution of this type of model exists, maximum likelihood optimisation is used to estimate the parameters. For this estimation, the MTREATREG-command for Stata of Deb (2009) is used. For the estimation two endogenous treatment options have been used, being the possession of the museum pass and being in possession of another type of discount pass.

Several control variables have been used in the estimation of the equation for the probability of possessing a museum pass (or another discount pass): gender, age (in 5-year categories), region (in 40 categories), household income (in eight categories), highest level of education (in six categories), highest level of education of parents (in six categories) and an indicator for students.

For the estimation of the number of museum visits, the same control variables have been used. Exceptions are the household income and the indicator for students, as they are primarily indicators for reasons to posses another type of discount pass and not of the willingness to visit a museum. Household income and the indicator for students are used as an instrument in this estimation.

Data

For this analysis, two main sources of information have been used: a survey among museum visitors and administrative data about pass holders and their museum visits.

In the survey, a representative sample of the Dutch population of at least 16 years old was interviewed. Of this sample, a selection has been included in the analysis. These are people who visited at least one Dutch museum in the last three years. Weights have been calculated based on gender, age and living region. 300 out of the 2,070 respondents possessed a museum pass. The respondents were interviewed about their museum visits in 2012 and their spending in museum cafes and shops. The survey was carried out in May 2013.

The administrative data contains background information on the pass holders like age, gender, purchase date and address. Furthermore, these data contains every museum visit of the pass holders in 2012. As the administrative data does only contain information of museum visits of museum pass holders, it cannot be used to estimate the effect of the museum pass on museum visits. It does however provide vital background information to check the validity of the survey results.

3. Results

Effect of museum pass on museum visits

According to the survey results presented in Table 1, respondents visited a Dutch museum on average 2.2 times in 2012. Museum pass holders said that they on average visited 6.2 museums. As we know from the administrative data, the number of visits with a museum pass of this group was in reality 5.8 times in 2012. That shows that the survey results are fairly reliable. Museum visitors who were eligible for another type of discount went on average 2.4 times to a museum, while museum visitors without a discount went to a museum 1.3 times. 16 respondents (0.7% of the respondents) visited a museum more than 20 times in 2012 of whom 11 owned a museum pass. If these extreme cases are omitted in the sample, the average number of museum visits of museum pass holders reduces to 5.2. When the extreme cases are omitted in the administrative data, the average number of museum visits of museum pass holders reduces to 4.7. As this paper focuses on the effect of the museum pass on regular museum visitors, not on extreme cases, persons who visited more than 20 museums in 2012 are omitted.

Table 1   Museum visits by type of visitor

Type of museum visitor	Average museum visits in last 12 months	Number of observations	Average museum visits in last 12 months (if <= 20)	Number of observations
Museum pass holder	6.2	300	5.2	291
Holder of other type of discount pass	2.4	348	2.1	344
Other visitors	1.3	1422	1.3	1419
Total	**2.2**	**2070**	**2.0**	**2054**

The full estimation results are presented in Table 2. These are both the estimation results of the multinomial logit equation estimating the probability of owning a museum pass or other type of discount pass, as from the count model explaining the number of museum visits. The results show that students and low-income respondents have a larger probability of possessing another type of discount pass. Furthermore, older people, high-income people, highly educated people and people with highly educated parents more often possess a museum pass. As these characteristics are commonly seen as drivers for cultural participation, these results are as expected.

It is found that museum pass holders visit a museum 3.0 times as often when corrections are made for differences in background characteristics. The 95%-confidence interval of this effect is 2.1 to 4.3. Other characteristics that influence the number of museum visits are age and education level. Possession of other types of discount passes does not have a significant influence on museum visits, whereas the uncorrected results in Table 1 show that they visit a museum 1.6 as often as museum visitors without a discount do. All of this difference can be explained by differences in background characteristics.

Table 2 Estimation results of effect museum pass on museum visits

	Effect on museum visits	Effect on probability of owning museum pass	Effect on probability of owning other type of discount pass
Females (ref males)	0.096**	0.097	-0.036
Age class: 20-24 (ref 15-19)	-0.056	-1.293**	-0.954***
Age class: 25-29	-0.475***	-1.847**	-1.768***
Age class: 30-34	-0.429***	-0.630	-1.687***
Age class: 35-39	-0.198	-0.895	-1.504***
Age class: 40-44	-0.257**	-1.021	-1.615***
Age class: 45-49	-0.161	-0.847	-1.513***
Age class: 50-54	-0.226*	-1.110*	-1.714***
Age class: 55-59	-0.169	-0.693	-2.435***
Age class: 60-64	-0.058	0.536	-1.412***
Age class: 65-69	-0.084	0.618	-0.958**
Age class: 70-89	0.152	1.051	-1.123**
Type of Household: with partner without children (ref: single)	-0.021	-0.695***	0.105
Type of Household: with partner and children	-0.049	-0.654**	0.233
Type of Household: single with children	-0.118	-0.441	0.189
Type of Household: other	0.116	-0.207	-0.083
Household income: between €12.500 and €20.000 (ref: <€12.500)		1.045*	0.137
Household income: between €20.000 and €26.200		0.869	-0.193
Household income: between €26.200 and €32.500		1.146**	-0.269
Household income: between €32.500 and €38.800		1.172**	-0.671*
Household income: between €38.800 and €51.300		0.808	-0.749*
Household income: between €51.300 and €65.000		0.983*	-0.473
Household income: above €65.000		1.718***	-0.419
Household income: won't say		1.180**	-0.378
Highest level of education: higher professional (ref: university)	0.03	0.011	0.222
Highest level of education: senior general secondary / pre-university	-0.086	-0.825**	0.417
Highest level of education: secondary vocational	-0.233***	-0.993***	0.026
Highest level of education: pre-vocational	-0.173*	-0.811**	0.552
Highest level of education: lower pre-vocational	-0.309**	-0.655	0.198
Highest level of education: won't say	0.095	0.839	0.487
Highest level of education parents: higher professional (ref: university)	0.014	-0.896***	-0.166
Highest level of education parents: senior general secondary / pre-university	-0.040	-0.847**	-0.601*
Highest level of education parents: secondary vocational	-0.075	-1.013***	-0.303
Highest level of education parents: pre-vocational	-0.055	-0.728**	-0.445
Highest level of education parents: lower pre-vocational	-0.127	-0.943***	-0.788**
Highest level of education parents: won't say	-0.148	-1.504***	-0.667**
Dummies for regions (40)	included	included	included

Dummy for students		-0.368	0.661**
Dummy for museum pass owner	1.101***		
Dummy for owner other type of discount pass	-0.051		
Constant	0.431*	-0.922	-0.093
Number of observations	2052		

Based on the estimation results and the fact that museum pass holders made 5.0 million museum visits in 2012, we estimate that pass holders would have made 1.4 (=5.0 million visits/3.01) million visits if the museum pass would not have existed. This implies that 18 percent of the 20 million museum visits per year in the Netherlands are made because of the existence of the museum pass.

Financial effects of museum pass on museums
The calculation of the financial effects of the museum pass is based on the model of Throsby (1994) for the behaviour of performing arts firms that Frey and Meier (2006) applied for museums. In this model, museums are assumed to be utility maximizing with respect to the number of visitors and the quality of exhibitions. In this model museums gain revenues from entrance fees, donations and grants, and from ancillary goods like the museum shop, restaurant and cafe. The entrances fees and the revenue from ancillary goods depend on the number of visitors. For the situation with the museum pass, the sharing of the museum pass revenues covers entrance fees, but museums can generate direct revenue from ancillary goods that museum visitors with a museum pass consume.

On the cost side, museums typically have a cost structure of high fixed costs; while marginal costs are close to zero (Frey and Meier, 2006). These marginal costs are only close to zero in the short run when a museum is not operating capacity (Bailey & Falconer, 1998). As we assume that the participating museum indeed not operate at full capacity and analyse the short term effects, the marginal costs of extra visitors are set equal to zero in our model. However, there are large indirect costs in the form of lost revenue, as a part of the museum pass holders would have visited the museum otherwise while paying the full entrance price. The revenue share from the museum pass museums get for a visitor is lower than the full entrance price. The extra revenues from museum pass visits for an individual museum i are described as following:

$$U_{entrance\ fees,i} = \alpha * p_{full,i} * y_{museum\ pass\ visits,i} - p_{full,i} * \left(y_{museum\ pass\ visits,i} - y_{baseline\ visits,i} \right)$$

where α is the benefit percentage of the full entrance fee that is paid for by the museum pass, $p_{full,i}$ is the full entrance fee, $y_{museum\ card\ visits,i}$ is the number of visits from museum pass holders and $y_{baseline\ visits,i}$ is the number of visits the museum pass holders would have made if the museum pass had not existed.

In the calculation of the revenue from ancillary goods, the marginal costs of the extra sales of ancillary goods to museum pass visitors cannot be set equal to zero, as the purchase price for the museums of the ancillary goods is of course greater than zero. To take into account for this, the average profit margin of museums regarding its shop, restaurant and cafe is incorporated in the revenue calculation. So the extra profit for museums is calculated by:

$$U_{\text{ancillary goods},i}$$
$$= m_{cafe,i} * r_{cafe,i}\left(y_{museum\ pass\ visits,i} - y_{baseline\ visits,i}\right) + m_{shop,i}$$
$$* r_{shop,i}\left(y_{museum\ pass\ visits,i} - y_{baseline\ visits,i}\right)$$

where $m_{cafe,i}$ is the average profit margin of the cafe, $r_{cafe,i}$ is the average consumption in the cafe per visit (including visits where the cafe is not visited), $m_{shop,i}$ is the average profit margin of the shop, $r_{shop,i}$ is the average consumption in the shop per visit (including visits where the shop is not visited). To stay conservative, it is assumed that museum pass visitors spend as much on ancillary goods when visiting a museum with a museum pass, as they would do if the museum pass would not exist. Also, as an only minority of the relevant museums have an own restaurant, restaurant revenues have not been taken into account in this calculation. The profit margins are based on the results of the survey under museums, where the revenues and the cost prices of the goods sold in the shops and cafes are asked.

The total financial revenue of the museum pass for a museum exists of the entrance fee related revenue and the revenue of the sale of ancillary goods. Furthermore, museums get a provision fee for museum passes that are sold in their museum. This provision is paid from the total museum pass revenues, just as the contribution for a museum visit with a museum pass. So the total revenue of the museum pass for a museum is calculated by:

$$U_{museum\ card,i} = U_{entrance\ fees,i} + U_{ancillary\ goods,i} + U_{provisions,i}$$

Using the results of the previous analyses of the amount of 5.0 million museum visits by museum pass holders, 1.4 million baseline museum visits, an average price level of € 9.16 and a benefit percentage of 65%, the total extra entrances fee related revenues from the museum pass are € 13.2 million in 2012. Furthermore, the total provision was € 0.7 million.

The extra profits from ancillary goods are estimated to be € 7.5 million from the cafes and € 5.2 million from the museum shops. This is based on an estimated average margin of 118% on goods sold in the shop and a margin of 102% on cafe consumptions. This estimation is weighted by museum visits, so the profit margins of the large museums (with large shops and cafes) are driving this estimated average margin. These figures are based on the survey among museum directors. These margins are higher than the margins used in other literature, which are typically around 40%[2]. The average consumption in the shop for visits with a museum pass is €2.88 and the average consumption in the museum cafe is €4.40. These figures are based on the questionnaire of museum visitors where visitors were asked to recall their spending on ancillary goods during their last museum visits.

This leads to a total financial effect of €26.6 million that has to be divided between the 388 participating museums. As the museums that accept the museum range from the 'superstar' class (Frey and Meier, 2006) with more than 1 million visitors a year to very small museums with less than 5000 yearly visitors, the financial effect is not equal between museums. The 10 participating museums with the highest revenues from the museum pass generate in total 39% of this effect,

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[2] The British Association of Independent Museums has published a retail guideline for small museums. They claim that it is normal for a museum shop to have on average 45% gross profit (Prescott, 2003). Kirk (2005) claims that museum shops operating paid staff should have a profit margin around 35-40% and museums shops operating volunteer staff have a profit margin around 45 to 55%.

whereas the 100 smallest museums together generate 0.35% of the total revenue. Therefore, the disparity in size of the participating museums comes back in the distribution of the financial effects of the museum pass. However, the average contribution of around €1000 for a small museum can still be substantial for their finances as the typical budget of such a museum is also very limited.

To check for the robustness of the results, the revenues are also calculated with conservative estimates of the parameters. Here, the effects of the museum pass on museum visits of 2.1 instead of 3.0 (which leads to 2.4 million baseline visits) is used and the profit margin for the museum shop and the museum cafe is set to be 40%. Then, the total financial effect is then €12.8 million, of which €6.6 million can be attributed to the entrance fees. So even without the extra sales of ancillary goods, the museum pass is profitable for the museums.

Conclusion and discussion

Econometric analysis of museum visits shows strong benefits from the national museum pass in the Netherlands, both in terms of financial returns to museums and the total number of museum visits. The analysis explains both pass holdership and museum visits using control variables, and taking account of endogeneity of pass holder ship. Without the museum pass, the total number of museum visits would be 18% lower as museum pass holders visit a museum three times more often because of the museum pass. There is also a substantial financial effect for the participating museums in both revenues of the museum pass income as well as the additional sales of ancillary goods.

The main limitation of the analysis is that we cannot be sure that all relevant control variables have been included in the analysis. Even controlling for gender, age, region, household income, education level, parents' education level and students, it is still possible that there are remaining differences between people who often visit museums and people who do not. Moreover, if these differences are positively correlated with both museum visits and pass holder ship, the analysis may overestimate the true effect of the pass. On the other hand, it may be that all important variables are included, or that non-included factors are not correlated with both pass holdership and museum visits. To test for this, a (quasi) experiment would be needed.

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