EAAM: EVALUATING SOLAR INVESTMENTS[1]

The first assignment Sonja Petterson is given at EAMM is to evaluate the purchase of 31 solar power plants in the Puglia area of Southern Italy with a combined installed capacity of 30 MWp and an annual electricity production of 44 Gwh. With an MBA from Bergen Business School, having excelled in their Real Options course, Sonja believes that modern financial analysis should be used for this assignment. In addition, there would be several trips to Bari and Brindisi, so Sonja could warm up especially during the winter months. EAMM has received "initial pitches during the year to start negotiations on more than 1000 MWp of possible acquisition targets in Italy", so Sonja considers this assignment a nearly perpetual opportunity to invest in

 This case is for the purpose of class discussion only and is not intended as an illustration of either good or bad business practices or politics. The character of Sonja Petterson is fictitious, but some of the solar PV material is from the EAM Prospectus January 2014 and Annual Report December 2014.

facilities with an expected physical life of up to 20 years. Currently the solar PV technology is such that a government subsidy is required to compete with coal or natural gas. Both the size of the possible government subsidy and the characteristic of the subsidy arrangements matter, along with the physical aspects of the facility and the level and volatility of market prices for electricity in Italy. Sonja is given a huge database of electricity prices and production, for every hour every day 2014-2015 for the whole of Italy and for four separate areas in the south. From all this data, she hopes to calculate reasonable estimates for price and quantity average levels, volatility and escalation/or deterioration over time to enter into the template for a real option capital budgeting spreadsheet, designed recently by Adkins and Paxson (2016).

An Easy Stochastic P, Q and S Model

Consider a perpetual opportunity to acquire a solar PV facility at a fixed investment cost K. The value of this investment opportunity, denoted by ROV_1, depends on the amount of output sold per unit of time, denoted by Q, the market price per unit of output, denoted by P, and the subsidy per output unit, S. All of these variables are assumed to be stochastic and are assumed to follow geometric Brownian motion processes:

$$\mathrm{d}X = \alpha_X X\mathrm{d}t + \sigma_X X\mathrm{d}Z \tag{1}$$

for $X \in \{P, S, Q\}$, where α denotes the instantaneous drift parameter, σ the instantaneous volatility, and $\mathrm{d}Z$ the standard Wiener process. Potential correlation between the variables is represented by ρ, r is the risk-free rate, and θ_X is the risk-neutral drift rate (θ=r-α). When P,Q, or S are below $\hat{P}, \hat{Q}, \hat{S}$ that justify immediate investment, the real option investment value is:

$$ROV_1 = A_1 P^{\beta_1} Q^{\gamma_1} S^{\eta_1} . \tag{2}$$

where β_1 , γ_1 and η_1 are the power parameters for this option value function. After the investment, the plant generates revenue equaling $PQ + SQ$, with the present value factor of this net revenue denoted $k_{PQ,}$ and k_{SQ} (deducting operating costs).

$$k_{PQ} = \frac{1 - e^{-(r-\theta_P-\theta_Q)*T}}{(r-\theta_P-\theta_Q)} \tag{3}$$

$$k_{SQ} = \frac{1 - e^{-(r-\theta_S-\theta_Q)*T}}{(r-\theta_S-\theta_Q)} . \tag{4}$$

The value matching relationship, when the real option value upon exercise is equal to the net present value of the investment less the investment cost K (NPV), is:

$$A_1 \hat{P}^{\beta_1} \hat{Q}^{\gamma_1} \hat{S}_1^{\eta_1} = k_{PQ} \hat{P}\hat{Q} + k_{SQ} \hat{S}_1 \hat{Q} - K \tag{5}$$

$\hat{P}, \hat{Q}, \hat{S}_1, \beta_1, \gamma_1, \eta_1, A_1$ is obtained by assuming $\hat{P} = P, \hat{Q} = Q$ as in Adkins and Paxson (2015, 2016), and then finding $\hat{S}_1, \beta_1, \gamma_1, \eta_1, A_1$. An analytical solution for the five unknowns is:

$$A_1 = k_{PQ} \hat{P}\hat{Q} / \beta_1 \hat{P}^{\beta_1} \hat{Q}^{\gamma_1} \hat{S}_1^{\eta_1} \tag{6}$$

and

$$\hat{S}_1 = \eta_1 k_{PQ} \hat{P} / \beta_1 k_{SQ} \tag{7}$$

This implies that

$$\gamma_1 = \beta_1 + \eta_1 \tag{8}$$

$$\eta_1 = 1 + \beta_1 \left(\frac{K}{k_{PQ} \hat{P}\hat{Q}} - 1 \right) \tag{9}$$

β_1 is the solution to a quadratic equation:

$$Q(\beta_1) = \beta_1^2 \{a\} + \beta_1 \{b\} - \{c\} = 0 \tag{10}$$

$$a = \left\{ \tfrac{1}{2}\sigma_P^2 - \rho_{PS}\sigma_P\sigma_S + \tfrac{1}{2}\sigma_S^2 \right.$$
$$+ \frac{K^2}{2\hat{P}^2\hat{Q}^2 k_{PQ}^2}[\sigma_Q^2 + 2\rho_{QS}\sigma_Q\sigma_S + \sigma_S^2]$$
$$\left. + \frac{K}{\hat{P}\hat{Q}k_{PQ}}[\rho_{PQ}\sigma_P\sigma_Q + \rho_{PS}\sigma_P\sigma_S - \rho_{QS}\sigma_Q\sigma_S - \sigma_S^2 \right\}$$

$$b = \left\{ \theta_P - \theta_S - \tfrac{1}{2}\sigma_P^2 - \tfrac{1}{2}\sigma_S^2 + \rho_{PQ}\sigma_P\sigma_Q + \rho_{PS}\sigma_P\sigma_S - \rho_{QS}\sigma_Q\sigma_S \right.$$
$$\left. + \frac{K}{\hat{P}\hat{Q}k_{PQ}}[\theta_Q + \theta_S + \frac{\sigma_Q^2}{2} + 2\rho_{QS}\sigma_Q\sigma_S + \frac{\sigma_S^2}{2}] \right\}$$
$$c = -\left\{ r - \theta_Q - \theta_S - \rho_{QS}\sigma_Q\sigma_S \right\}$$

$$\beta_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \qquad (11)$$

It is easy to put these formulae into Excel as shown below.

	A	B	C	D
1			**SUBSIDIES MODEL I**	
2	**INPUT**	Stochastic P & Q & S	TEMPLATE per kwh	
3	P	0.40		
4	Q	1.00		
5	S	0.10		
6	T	20		
7	K	7.00		
8	σ_P	0.06		
9	σ_Q	0.04		
10	σs	0.08		
11	ρ_{PQ}	0.00		
12	ρ_{PS}	0.00		
13	ρ_{SQ}	0.00		
14	r	0.04		
15	θ_P	0.00		
16	θ_Q	0.00		
17	θs	0.00		
18	**OUTPUT**			EQS
19	a	0.0033	0.5*(B8^2)+0.5*(B10^2)-B12*B8*B10+((B7^2)/(2*B33))*((B9^2)+2*B13*B9*B10+(B10^2))+(B7/B32)*(B11*B8*B9+B12*B8*B9-B13*B9*B10-(B10^2))	10
20	b	0.0001	B15-B17-0.5*(B8^2)-0.5*(B10^2)+B11*B8*B9+B12*B8*B10-B13*B9*B10+(B7/B33)*(B16+B17+0.5*(B9^2)+2*(B13*B9*B10)+0.5*(B10^2))	10
21	β1	3.4542	(-B20+SQRT((B20^2)-4*B19*(-B14+B16+B17+B13*B9*B10)))/(2*B19)	11
22	η1	1.9367	1+B21*((B7/(B28*B30*B29))-1)	9
23	γ1	5.3908	B21+B22	8
24	A1	683.0290	B32/(B21*(B28^B21)*(B29^B23)*(B25^B22))	6
25	**S^1**	**0.2243**	(B22*B28*B30)/(B21*B31)	7
26	**ROV 1**	**0.3336**	IF(B5<B25, B24*(B3^B21)*(B4^B23)*(B5^B22),B27)	2
27	NPV EX	1.5942	(B30*B28*B29)+(B31*B25*B29)-B7	RHS 5
28	P^	0.4000		
29	Q^	1.0000		
30	PV kPQ	13.7668	(1-EXP(-(B14-B15-B16)*B6))/(B14-B15-B16)	3
31	PV kSQ	13.7668	(1-EXP(-(B14-B17-B16)*B6))/(B14-B17-B16)	4
32	PQkPQ	5.5067	B28*B29*B30	10
33	P^2Q^1kPQ^2	30.3239	(B28^2)*(B29^2)*(B30^2)	10

Solar Facility[2]

The solar facility acquisition price K is € 114 million, or about €2590 per MWhr (1000 kWh) for expected production of 44.2 GWh (1000MWh) per annum. The plants in the acquisition have a two-tiered structure, a fixed FIT of around €309 per MWh and a variable RIP of about €60, for total gross revenue of around €16.3 million. Operating costs (and taxes) are around €2 million.

	A	B	C	D	E
32	ALL	Total GWh		Total FIT	**Per KWh**
33		44.2		€ 13,657.70	
34	Weighted FIT				**0.3090**
35	RIP				**0.0600**
36	REVENUE		€ 2,652.00	€ 16,309.70	
37	R Distribution		16.26%	83.74%	
38	OP COST		€2,000.00		**0.0452**
39	kPV	7.9810	(1-EXP(-(B41-B42-B43)*B40))/(B41-B42-B43)		
40	T	16			
41	IRR	10.00%			
42	θP	0			
43	θQ	0			
44	GPV	€114,206.21	(D36-C38)*B39		**0.3237**
45	K	€114,000.00			**2.5792**
46	NPV	€206.21	B44-B45		**0.0047**
47	Net Market Revenue				**0.0148**

As illustrated above the approximate IRR is around 10% on these projected revenues and expected operating costs, for a facility that has 16 years left (constructed in 2011). However, EAMM aims to extend the life of these assets beyond 20 years, and also to replace modules of the facilities with more efficient ones over the next 5-10 years.

Italian Solar Energy[2]

Although EAMM intends to sell most output to GSE (the Italian renewable energy executive authority, also providing the FIT), the RIP are based on the Italian Power Energy (IPEX) prices. There are at least five price series that might be representative of actual prices in the Puglia area, the National Price, and Prices in Central-South, South, Foggia and Brindisi, see

[2] Source: EAM Prospectus January 2014.

www.mercatoelecttrico.org. The FIT arrangements are complicated and change over time, as described in the EAM prospectus.

Empirics

From the Italian electricity daily price series per annum volatility is calculated as STDEV of LN(Price t/Price t-1)*SQRT (365). The annualized price drift might be 365*AVERAGE of LN(Price t/Price t-1). There are five price series running hourly from 2015 01 01 (January 1) to end November 11 30, over 40,000 prices. Sonja starts with a sample of daylight hours 8 am to 4pm for the first week in January 2015. She notices that these seven days include New Years Day, when most Italians are resting, and a weekend, so much of the apparent daily price volatility (for sunlight hours) is due to a type of "seasonality".

For the production output units, EAM reports that "about 19% of annual power output will be generated in the first quarter of the year, increasing to 33% in the second and 34% in the third before declining to 14% in the fourth." The actual power production by quarter for 2013 and 2014 is given in the Appendix "EAM Q 2013-2014" by facility. There is no evidence that solar output is constant, as modeled by some Nordic authors. Sometimes (July 2013) wind and solar provides all of the electricity supply in Italy during the daytime.

Investment Criteria

Although Norway has a distinguished history of real options, starting with Mossin (1968), and Lund and Øksendal (1991), and popularized by Bjerksund and Ekern (1995), not all Norwegian financial experts have completely adopted the real options methodology. EAMM reports using an investment criteria of a project internal rate of return of 7-12%. "The high degree of predictability in revenue and operating cost make the variations in cash flow from these power plants from year to year over their 20 year life-cycle low. The single most important variable in terms of IRR sensitivity is the electricity volume…but changes in the interest rate will also have a significant impact…Policy regimes where the power consumers (like in Italy) fund the FIT subsidies …have proven to be more robust against policy risk, particularly against retroactive subsidy cuts and tax changes for power plants in operation."

References

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Lund, D. and B. Øksendal (eds.), *Stochastic Models and Option Values: Applications to Resources, Environment and Investment Problems*, (1991) North-Holland, Amsterdam.

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EVALUATING SOLAR INVESTMENTS**: CASE QUESTIONS**

1. Substituting your calculations of the electricity price and quantity of production drifts, correlation and volatility, what is the FIT (S) threshold that would justify making this investment now for K?
2. What should Sonja suggest paying if the FIT=€308 per MWh?
3. What is this acquisition worth if the FIT disappear?
4. Given P,Q, S and T, which of the ten inputs should be Sonja’s primary focus?

ITALIAN ELECTRICITY PRICES & PRODUCTION FIRST WEEK 2015

Data/Date (YYYYMMDD)	Ora Hour	PUN	BRNN	CSUD	FOGN	SUD	PUN	BRNN	CSUD	FOGN	SUD	PUN	BRNN	CSUD	FOGN	SUD	PUN	BRNN	CSUD	FOGN	SUD
20150101	1	52.33	51.10	51.10	51.10	51.10															
20150101	2	49.89	49.00	49.00	49.00	49.00															
20150101	3	39.10	39.10	39.10	39.10	39.10															
20150101	4	35.87	35.87	35.87	35.87	35.87															
20150101	5	33.40	33.40	33.40	33.40	33.40															
20150101	6	36.47	36.57	36.57	36.57	36.57															
20150101	7	39.10	39.10	39.10	39.10	39.10															
20150101	8	44.52	45.21	45.21	45.21	45.21	44.52	45.21	45.21	45.21	45.21										
20150101	9	38.43	40.00	40.00	40.00	40.00	38.43	40.00	40.00	40.00	40.00										
20150101	10	40.38	40.80	40.80	40.80	40.80	40.38	40.80	40.80	40.80	40.80										
20150101	11	38.53	38.80	38.80	38.80	38.80	38.53	38.80	38.80	38.80	38.80										
20150101	12	38.80	38.80	38.80	38.80	38.80	38.80	38.80	38.80	38.80	38.80										
20150101	13	38.85	38.85	38.85	38.85	38.85	38.85	38.85	38.85	38.85	38.85										
20150101	14	38.80	38.80	38.80	38.80	38.80	38.80	38.80	38.80	38.80	38.80										
20150101	15	38.85	38.85	38.85	38.85	38.85	38.85	38.85	38.85	38.85	38.85	39.64	40.01	40.01	40.01	40.01					
20150101	16	51.10	49.95	49.95	49.95	49.95															
20150101	17	55.50	54.69	54.69	54.69	54.69															
20150101	18	62.20	61.90	61.90	61.90	61.90															
20150101	19	58.90	58.20	58.20	58.20	58.20															
20150101	20	56.96	57.88	57.88	57.88	57.88															
20150101	21	55.99	57.87	57.87	57.87	57.87															
20150101	22	53.12	53.63	53.63	53.63	53.63															
20150101	23	49.35	49.46	49.46	49.46	49.46															
20150101	24	44.89	43.00	43.00	43.00	43.00															
20150102	1	49.81	48.50	48.50	48.50	48.50															
20150102	2	41.01	39.10	39.10	39.10	39.10															
20150102	3	38.98	37.00	37.00	37.00	37.00															
20150102	4	35.28	33.00	33.00	33.00	33.00															
20150102	5	36.33	34.19	34.19	34.19	34.19															
20150102	6	40.60	38.85	38.85	38.85	38.85															
20150102	7	52.30	51.35	51.35	51.35	51.35															
20150102	8	56.77	56.15	56.15	56.15	56.15	56.77	56.15	56.15	56.15	56.15										
20150102	9	64.24	63.98	63.98	63.98	63.98	64.24	63.98	63.98	63.98	63.98										
20150102	10	64.25	63.98	63.98	63.98	63.98	64.25	63.98	63.98	63.98	63.98										
20150102	11	64.84	64.75	64.75	64.75	64.75	64.84	64.75	64.75	64.75	64.75										
20150102	12	62.92	59.36	63.04	59.36	59.36	62.92	59.36	63.04	59.36	59.36										
20150102	13	58.45	57.92	57.92	57.92	57.92	58.45	57.92	57.92	57.92	57.92										
20150102	14	58.45	57.92	57.92	57.92	57.92	58.45	57.92	57.92	57.92	57.92								"DAILY RETURN"		
20150102	15	66.10	66.10	66.10	66.10	66.10	66.10	66.10	66.10	66.10	66.10	62.00	61.27	61.73	61.27	61.27	0.45	0.43	0.43	0.43	0.43
20150102	16	69.83	69.96	69.96	69.96	69.96															
20150102	17	70.20	70.36	70.36	70.36	70.36															
20150102	18	75.00	75.00	75.00	75.00	75.00															
20150102	19	68.80	72.21	72.21	72.21	72.21															
20150102	20	65.56	72.78	72.78	72.78	72.78															
20150102	21	61.09	67.03	67.03	67.03	67.03															
20150102	22	58.31	63.99	63.99	63.99	63.99															
20150102	23	55.90	57.99	57.99	57.99	57.99															
20150102	24	52.69	51.60	51.60	51.60	51.60															
20150103	1	50.96	49.78	49.78	49.78	49.78															
20150103	2	41.90	40.14	40.14	40.14	40.14															
20150103	3	37.81	37.81	37.81	37.81	37.81															
20150103	4	37.57	37.57	37.57	37.57	37.57															
20150103	5	37.15	37.15	37.15	37.15	37.15															
20150103	6	37.81	37.81	37.81	37.81	37.81															
20150103	7	49.60	48.50	48.50	48.50	48.50															
20150103	8	56.01	55.34	55.34	55.34	55.34	56.01	55.34	55.34	55.34	55.34										
20150103	9	60.41	60.00	60.00	60.00	60.00	60.41	60.00	60.00	60.00	60.00										
20150103	10	60.51	60.10	60.10	60.10	60.10	60.51	60.10	60.10	60.10	60.10										
20150103	11	55.22	54.43	54.43	54.43	54.43	55.22	54.43	54.43	54.43	54.43										
20150103	12	53.75	52.89	52.89	52.89	52.89	53.75	52.89	52.89	52.89	52.89										
20150103	13	52.00	50.99	50.99	50.99	50.99	52.00	50.99	50.99	50.99	50.99										
20150103	14	51.91	50.87	50.87	50.87	50.87	51.91	50.87	50.87	50.87	50.87										
20150103	15	53.16	52.19	52.19	52.19	52.19	53.16	52.19	52.19	52.19	52.19	55.37	54.60	54.60	54.60	54.60	-0.11	-0.12	-0.12	-0.12	-0.12
20150103	16	55.54	54.76	54.76	54.76	54.76															
20150103	17	59.53	58.91	58.91	58.91	58.91															
20150103	18	63.54	63.20	63.20	63.20	63.20															
20150103	19	58.06	58.77	58.77	58.77	58.77															
20150103	20	55.44	58.71	58.71	58.71	58.71															
20150103	21	53.14	56.19	56.19	56.19	56.19															
20150103	22	47.34	48.99	48.99	48.99	48.99															
20150103	23	43.30	41.40	41.40	41.40	41.40															
20150103	24	41.14	39.10	39.10	39.10	39.10															
20150104	1	40.11	38.85	38.85	38.85	38.85															
20150104	2	34.51	34.43	34.43	34.43	34.43															
20150104	3	27.00	27.00	27.00	27.00	27.00															
20150104	4	19.40	19.40	19.40	19.40	19.40															
20150104	5	18.00	18.00	18.00	18.00	18.00															
20150104	6	21.00	21.00	21.00	21.00	21.00															
20150104	7	38.51	38.51	38.51	38.51	38.51															
20150104	8	44.56	44.56	44.56	44.56	44.56	44.56	44.56	44.56	44.56	44.56										
20150104	9	51.09	50.00	50.00	50.00	50.00	51.09	50.00	50.00	50.00	50.00										
20150104	10	53.57	52.65	52.65	52.65	52.65	53.57	52.65	52.65	52.65	52.65										
20150104	11	52.21	51.15	51.15	51.15	51.15	52.21	51.15	51.15	51.15	51.15										
20150104	12	51.01	49.78	49.78	49.78	49.78	51.01	49.78	49.78	49.78	49.78										
20150104	13	47.24	45.66	45.66	45.66	45.66	47.24	45.66	45.66	45.66	45.66										
20150104	14	42.14	40.14	40.14	40.14	40.14	42.14	40.14	40.14	40.14	40.14										
20150104	15	41.17	39.10	39.10	39.10	39.10	41.17	39.10	39.10	39.10	39.10	47.87	46.63	46.63	46.63	46.63	-0.15	-0.16	-0.16	-0.16	-0.16
20150104	16	50.53	49.30	49.30	49.30	49.30															
20150104	17	54.69	53.79	53.79	53.79	53.79															
20150104	18	63.91	63.74	63.74	63.74	63.74															
20150104	19	58.76	61.99	61.99	61.99	61.99															
20150104	20	60.25	64.00	64.00	64.00	64.00															
20150104	21	60.31	64.00	64.00	64.00	64.00															
20150104	22	54.89	53.93	53.93	53.93	53.93															
20150104	23	50.45	49.10	49.10	49.10	49.10															
20150104	24	47.22	45.61	45.61	45.61	45.61															
20150105	1	47.72	47.72	47.72	47.72	47.72															
20150105	2	39.10	39.10	39.10	39.10	39.10															
20150105	3	35.21	35.21	35.21	35.21	35.21															
20150105	4	32.43	32.43	32.43	32.43	32.43															
20150105	5	33.15	33.15	33.15	33.15	33.15															
20150105	6	38.85	38.85	38.85	38.85	38.85															
20150105	7	48.89	48.89	48.89	48.89	48.89															
20150105	8	60.36	60.03	60.03	60.03	60.03	60.36	60.03	60.03	60.03	60.03										
20150105	9	64.07	63.98	63.98	63.98	63.98	64.07	63.98	63.98	63.98	63.98										
20150105	10	64.55	64.50	64.50	64.50	64.50	64.55	64.50	64.50	64.50	64.50										
20150105	11	56.12	55.49	55.49	55.49	55.49	56.12	55.49	55.49	55.49	55.49										
20150105	12	54.25	53.50	53.50	53.50	53.50	54.25	53.50	53.50	53.50	53.50										
20150105	13	51.94	51.00	51.00	51.00	51.00	51.94	51.00	51.00	51.00	51.00										
20150105	14	51.38	50.39	50.39	50.39	50.39	51.38	50.39	50.39	50.39	50.39										
20150105	15	55.16	54.45	54.45	54.45	54.45	55.16	54.45	54.45	54.45	54.45	57.23	56.67	56.67	56.67	56.67	0.18	0.19	0.19	0.19	0.19
20150105	16	64.09	64.00	64.00	64.00	64.00															
20150105	17	64.33	64.25	64.25	64.25	64.25															
20150105	18	68.56	68.64	68.64	68.64	68.64															
20150105	19	67.02	67.00	67.00	67.00	67.00															
20150105	20	63.64	65.26	65.26	65.26	65.26															
20150105	21	60.51	64.00	64.00	64.00	64.00															
20150105	22	55.10	58.00	58.00	58.00	58.00															
20150105	23	52.37	52.10	52.10	52.10	52.10															
20150105	24	52.04	51.00	51.00	51.00	51.00															
20150106	1	50.91	49.78	49.78	49.78	49.78															
20150106	2	45.21	45.21	45.21	45.21	45.21															
20150106	3	38.80	38.80	38.80	38.80	38.80															
20150106	4	35.00	35.00	35.00	35.00	35.00															
20150106	5	33.43	33.43	33.43	33.43	33.43															
20150106	6	37.58	37.58	37.58	37.58	37.58															
20150106	7	43.50	43.50	43.50	43.50	43.50															
20150106	8	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00										
20150106	9	52.89	52.00	52.00	52.00	52.00	52.89	52.00	52.00	52.00	52.00										
20150106	10	52.05	51.04	51.04	51.04	51.04	52.05	51.04	51.04	51.04	51.04										
20150106	11	50.63	50.28	50.28	50.28	50.28	50.63	50.28	50.28	50.28	50.28										
20150106	12	49.10	49.10	49.10	49.10	49.10	49.10	49.10	49.10	49.10	49.10										
20150106	13	47.97	47.97	47.97	47.97	47.97	47.97	47.97	47.97	47.97	47.97										
20150106	14	45.11	45.11	45.11	45.11	45.11	45.11	45.11	45.11	45.11	45.11										
20150106	15	46.87	45.44	45.44	45.44	45.44	46.87	45.44	45.44	45.44	45.44	49.58	49.12	49.12	49.12	49.12	-0.14	-0.14	-0.14	-0.14	-0.14
20150106	16	53.40	52.49	52.49	52.49	52.49															
20150106	17	58.41	57.89	57.89	57.89	57.89															

Data/Date (YYYYMMDD)	Ora Hour	Totale Italia / Total Italy	BRNN	CSUD	FOGN	SUD	PUN	BRNN	CSUD	FOGN	SUD	PUN	BRNN	CSUD	FOGN	SUD	PUN	BRNN	CSUD	FOGN	SUD
20150101	1	23,671	2,230	2,545	409	2,602															
20150101	2	22,813	2,236	2,591	414	2,603															
20150101	3	21,949	2,097	2,611	417	2,677															
20150101	4	20,840	1,308	2,613	420	2,758															
20150101	5	20,157	1,299	2,129	419	2,685															
20150101	6	20,037	1,309	2,562	418	2,666															
20150101	7	20,983	2,159	2,471	524	2,545															
20150101	8	21,780	2,218	2,401	530	2,267	21780.33	2218.34	2401.27	530.10	2266.93										
20150101	9	22,191	1,872	2,520	531	2,428	22190.64	1872.33	2520.37	531.49	2427.53										
20150101	10	23,364	1,575	2,747	533	2,781	23363.52	1575.16	2746.53	533.09	2780.96										
20150101	11	24,369	1,339	2,972	536	3,173	24369.15	1338.55	2972.03	535.89	3173.02										
20150101	12	25,206	1,391	3,218	536	3,393	25206.33	1390.75	3218.06	536.42	3393.26										
20150101	13	25,750	1,800	3,220	537	3,453	25749.68	1799.64	3219.78	537.15	3452.67										
20150101	14	24,534	1,365	3,068	532	3,064	24534.39	1364.72	3068.34	532.02	3063.54										
20150101	15	23,560	1,817	2,898	526	2,585	23560.28	1816.52	2898.41	526.29	2584.88	23844.29	1672.00	2880.60	532.81	2892.85					
20150101	16	24,036	2,215	2,757	562	2,112															
20150101	17	25,825	2,414	2,683	556	1,819															
20150101	18	29,478	2,521	2,642	553	2,105															
20150101	19	30,583	2,417	2,688	550	1,991															
20150101	20	30,750	2,391	2,634	548	1,808															
20150101	21	30,129	2,390	2,696	547	1,629															
20150101	22	28,574	2,385	2,710	548	1,336															
20150101	23	26,817	2,210	2,520	549	1,321															
20150101	24	24,365	2,208	2,504	550	1,395															
20150102	1	22,668	2,200	2,421	394	1,395															
20150102	2	21,569	2,031	2,412	397	1,412															
20150102	3	20,471	1,276	2,485	400	1,477															
20150102	4	19,919	1,280	2,062	401	1,577															
20150102	5	20,139	1,280	2,202	403	1,608															
20150102	6	21,203	1,606	2,491	405	1,709															
20150102	7	24,149	2,212	2,457	514	1,629															
20150102	8	28,034	2,312	2,727	524	1,640	28033.65	2312.40	2726.93	523.85	1639.53										
20150102	9	30,423	2,510	2,836	971	1,797	30422.66	2510.48	2836.44	970.75	1796.95										
20150102	10	32,400	2,505	3,098	971	2,177	32400.49	2504.56	3098.12	971.10	2177.03										
20150102	11	32,315	2,610	3,255	970	2,465	32315.17	2610.09	3254.74	970.29	2465.43										
20150102	12	32,457	2,651	3,304	943	2,659	32456.52	2650.71	3303.63	942.68	2658.86										
20150102	13	31,652	2,503	3,084	918	2,597	31652.38	2503.31	3083.88	918.14	2597.16										
20150102	14	30,907	2,497	2,919	907	2,249	30906.99	2496.94	2919.44	906.80	2249.33								"DAILY RETURN"		
20150102	15	31,213	2,641	3,100	967	1,787	31213.30	2641.43	3099.60	966.92	1787.28	31175.14	2528.74	3040.35	896.32	2171.45	0.27	0.41	0.05	0.52	-0.29
20150102	16	31,626	2,638	3,582	1,057	1,300															
20150102	17	33,548	2,640	3,491	1,235	1,057															
20150102	18	36,985	2,648	3,626	1,387	1,130															
20150102	19	37,224	2,652	3,491	1,350	1,186															
20150102	20	36,735	2,661	3,524	1,350	1,183															
20150102	21	34,790	2,659	3,364	1,350	997															
20150102	22	31,997	2,509	3,275	931	921															
20150102	23	28,976	2,507	2,374	933	851															
20150102	24	26,093	2,198	2,218	934	885															
20150103	1	23,514	2,186	2,235	677	1,011															
20150103	2	21,884	2,185	2,302	433	1,023															
20150103	3	20,788	1,544	2,326	434	1,050															
20150103	4	20,228	1,247	2,346	431	1,077															
20150103	5	20,575	1,244	2,355	431	1,115															
20150103	6	21,042	1,539	2,356	431	1,141															
20150103	7	23,140	2,174	2,343	572	1,085															
20150103	8	25,834	2,168	2,355	897	1,090	25834.35	2168.29	2355.43	897.13	1089.93										
20150103	9	27,986	2,474	2,479	622	1,292	27985.98	2473.75	2479.14	622.36	1292.25										
20150103	10	30,093	2,468	2,709	853	1,636	30093.02	2468.27	2708.96	853.26	1635.94										
20150103	11	30,383	2,342	3,162	829	1,857	30382.63	2342.09	3161.51	828.54	1856.68										
20150103	12	30,553	2,339	3,167	829	2,230	30553.11	2339.34	3167.27	828.95	2230.32										
20150103	13	29,880	2,169	3,370	562	2,297	29880.44	2169.06	3369.58	561.92	2296.76										
20150103	14	28,800	2,225	3,035	562	2,140	28799.69	2225.33	3034.55	561.61	2139.80										
20150103	15	28,936	2,274	2,907	828	1,934	28935.75	2274.29	2907.31	828.35	1934.25	29058.12	2307.55	2897.97	747.76	1809.49	-0.07	-0.09	-0.05	-0.18	-0.18
20150103	16	29,222	2,591	3,117	484	1,652															
20150103	17	30,973	2,631	3,236	544	1,603															
20150103	18	34,345	2,703	3,502	724	1,833															
20150103	19	35,056	2,719	3,403	552	2,045															
20150103	20	34,842	2,696	3,493	557	2,041															
20150103	21	33,097	2,464	3,288	559	2,128															
20150103	22	30,690	2,396	2,790	492	2,255															
20150103	23	28,221	2,396	2,789	492	2,335															
20150103	24	25,817	2,214	2,790	491	2,371															
20150104	1	23,210	1,797	2,632	338	2,542															
20150104	2	21,667	1,259	2,272	337	2,621															
20150104	3	20,786	1,258	2,086	335	2,662															
20150104	4	20,482	1,258	2,055	334	2,607															
20150104	5	20,151	1,260	1,973	331	2,446															
20150104	6	20,409	1,265	1,887	327	2,235															
20150104	7	21,275	1,271	2,075	323	1,969															
20150104	8	22,803	2,212	1,956	438	1,707	22803.19	2212.24	1956.35	438.08	1706.75										
20150104	9	24,090	2,221	1,985	439	1,725	24089.96	2220.55	1984.52	438.68	1724.69										
20150104	10	26,322	2,225	2,159	438	1,963	26322.19	2224.63	2158.55	438.23	1963.31										
20150104	11	27,148	2,231	2,259	440	2,212	27148.04	2231.26	2259.09	439.85	2212.03										
20150104	12	27,796	2,240	2,403	441	2,331	27795.66	2240.49	2403.26	440.66	2331.49										
20150104	13	27,850	2,251	2,454	443	2,276	27849.89	2251.33	2454.16	442.54	2275.52										
20150104	14	26,467	2,252	2,510	444	2,379	26467.19	2252.28	2510.20	443.72	2379.44										
20150104	15	26,047	2,237	2,621	443	2,309	26047.00	2236.86	2620.79	443.23	2308.94	26065.39	2233.70	2293.36	440.62	2112.77	-0.11	-0.03	-0.23	-0.53	0.15
20150104	16	26,068	2,257	2,488	481	2,036															
20150104	17	27,367	2,299	2,590	483	1,886															
20150104	18	31,310	2,428	2,871	554	2,016															
20150104	19	31,930	2,468	2,879	559	2,046															
20150104	20	32,017	2,481	2,927	587	1,948															
20150104	21	31,345	2,482	2,929	615	1,931															
20150104	22	29,622	2,271	2,739	742	1,942															
20150104	23	27,205	2,271	2,606	490	1,991															
20150104	24	24,575	2,277	2,624	492	2,134															
20150105	1	22,331	1,597	2,472	338	2,076															
20150105	2	21,340	1,600	2,433	337	2,042															
20150105	3	20,257	965	2,520	339	2,116															
20150105	4	19,838	969	2,226	338	2,102															
20150105	5	20,057	969	2,236	335	2,131															
20150105	6	21,039	1,056	2,433	334	2,189															
20150105	7	23,972	1,604	2,357	333	2,200															
20150105	8	27,989	1,894	2,511	574	2,129	27989.05	1893.75	2510.85	574.43	2129.25										
20150105	9	30,445	1,896	2,690	971	2,508	30444.71	1895.84	2690.14	970.71	2507.77										
20150105	10	32,213	1,898	2,965	973	2,948	32212.70	1898.11	2965.41	973.12	2948.04										
20150105	11	32,142	1,902	3,161	927	3,234	32141.71	1901.70	3160.86	926.92	3233.63										
20150105	12	32,039	1,603	3,407	861	3,714	32038.51	1602.96	3407.29	860.91	3714.25										
20150105	13	31,607	1,622	3,505	475	4,002	31607.48	1622.35	3505.12	475.49	4001.73										
20150105	14	30,649	1,660	3,290	474	3,813	30649.18	1659.71	3290.48	474.00	3813.26										
20150105	15	31,073	1,981	3,319	931	3,378	31072.72	1981.49	3318.68	931.43	3377.98	31019.50	1806.99	3106.07	773.38	3215.74	0.17	-0.21	0.30	0.56	0.42
20150105	16	31,753	2,205	3,644	605	2,827															
20150105	17	33,298	2,249	3,410	1,160	2,424															
20150105	18	37,010	2,348	3,577	1,378	2,531															
20150105	19	37,271	2,644	3,460	1,372	2,310															
20150105	20	36,890	2,500	3,300	1,368	2,219															
20150105	21	34,936	2,496	3,214	1,052	1,932															
20150105	22	32,416	2,496	2,507	939	1,770															
20150105	23	29,178	2,191	2,165	905	1,611															
20150105	24	25,934	2,191	2,150	547	1,601															
20150106	1	23,294	2,314	1,779	778	1,681															
20150106	2	21,923	2,318	1,818	514	1,664															
20150106	3	20,724	1,687	1,828	393	1,697															
20150106	4	20,236	1,398	1,846	398	1,844															
20150106	5	20,070	1,398	1,521	400	1,908															
20150106	6	20,696	1,402	1,885	403	1,968															
20150106	7	22,413	2,333	1,888	402	2,076															
20150106	8	23,765	2,324	1,892	330	1,942	23764.81	2324.03	1891.99	330.20	1942.04										
20150106	9	24,914	2,324	2,063	328	2,140	24913.61	2323.87	2063.10	327.97	2140.26										
20150106	10	26,491	2,323	2,282	327	2,636	26490.65	2323.04	2281.74	327.08	2635.94										
20150106	11	27,276	2,326	2,550	329	2,879	27275.95	2326.40	2549.52	328.97	2878.75										
20150106	12	27,834	2,329	2,859	334	3,198	27833.88	2329.34	2858.65	333.61	3198.14										
20150106	13	27,698	2,331	2,945	337	3,290	27697.79	2330.91	2945.09	337.03	3290.07										
20150106	14	26,173	2,320	2,852	335	2,942	26173.10	2319.62	2852.07	335.31	2942.11										
20150106	15	25,358	2,316	2,637	333	2,430	25357.94	2315.95	2637.50	333.00	2429.57	26188.47	2324.14	2509.96	331.65	2682.11	-0.17	0.25	-0.21	-0.85	-0.18
20150106	16	25,635	2,356	2,530	328	1,885															
20150106	17	27,162	2,650	2,259	392	1,474															