Problem 7. «RSA signature»

We want to sign the message M using the RSA-signature. As usually, let $N = p \cdot q$ be the RSA-modulus, where p and q are two big primes. Let e be the RSA-public exponent and d be the RSA-secret exponent satisfying that $e \cdot d = 1 \mod (p-1)(q-1)$. The desired signature is given by

$$S = M^d \mod N.$$

Suppose that the attacker knows the value

$$M_p := M^{d_p} \mod p,$$

but he doesn't know the value

$$M_q := M^{d_q} \mod q,$$

where

$$d_p := d \mod (p-1), \quad d_q := d \mod (q-1).$$

If the attacker knows the modulus N (but not p and q), the public exponent e (but not d), and the original message M, what secret signature parameters can he calculate? Justify the answer.